

An Appraisal of the Cicadas of the Genus *Abricta* Stål and Allied Genera (Hemiptera: Auchenorrhyncha: Cicadidae)

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ABSTRACT. The cicada genus *Abricta* Stål currently contains a heterogeneous group of species which is considered best divided into four genera. *Abricta* sensu str. includes only *A. brunnea* (Fabricius) and *A. ferruginosa* (Stål) which are confined to Mauritius and neighbouring islands. The monotypic genus *Chrysolasia* n.gen., is proposed for a single Guatemalan species, *A. guatemalena* (Distant). Another monotypic genus, *Aleeta* n.gen., is proposed for the species *A. curvicosta* (Germar) from eastern Australia. Fourteen Australian species are placed in *Tryella* n.gen.: *castanea* Distant, *noctua* Distant, *rubra* Goding & Froggatt, *stalker* Distant, *willsi* Distant, *adela* n.sp., *burnsi* n.sp., *crassa* n.sp., *graminea* n.sp., *infuscata* n.sp., *kauma* n.sp., *lachlani* n.sp., *occidens* n.sp. and *ochra* n.sp.

The five remaining species currently placed in *Abricta* (*borealis* Goding & Froggatt, *burgessi* Distant, *cincta* Fabricius and *occidentalis* Goding & Froggatt from Australia plus *pusilla* Fabricius of unknown locality) do not belong to *Abricta* or closely allied genera.

Cladistic analyses place *C. guatemalena* basally on all trees. The Mauritian genus *Abricta* sensu str., and the genera, *Abroma* Stål and *Monomatapa* Distant, form a sister group to all Australian species. There is strong evidence suggesting that *Abricta* and *Abroma* are synonymous.

Keys to genera and species and maps of distribution are provided.

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The genus *Abricta* belongs to the tribe Taphurini and previously included 14 described species distributed through Australia, Mauritius, and Guatemala. The largest of these, *A. ferruginosa* (Stål) from Mauritius, attains a wingspan of over 100 mm while the smallest, now *Tryella castanea* (Distant) from Australia, has a wingspan of around 45 mm.

The historical review below shows that species of *Abricta* have been described on an ad hoc basis with no real assessment of generic limits. Many of the species descriptions lack detail and some important morphological characters have never been examined. Perusal of museum

specimens suggested that *Abricta* was not be a coherent generic group and highlighted many difficulties in identifying Australian specimens.

Abricta Stål is here redefined to include just two species that are found only in Mauritius. The genus *Chrysolasia* n.gen. is established to accommodate the single Guatemalan species. Two genera are erected for the Australian species: *Aleeta* n.gen. which includes *curvicosta* Germar only, while the remainder are placed in *Tryella* n.gen. Nine new species of *Tryella* are described from Australia, making a total of 14. It has been necessary to place considerable emphasis

on male genitalic structures in distinguishing these taxa as other morphological features provide insufficient characters.

The name “*Abricta* complex of genera” is introduced for the complex of the following related genera: *Abricta*, *Aleeta*, *Tryella*, *Chrysolasia*, *Abroma* Stål and *Monomatapa* Distant. The primary purpose of this revision is to review the Australian species of this complex. An appraisal of the generic status of the many species falling within *Abroma* has not been attempted; nor has an assessment of the possible synonymy of *Abroma* with *Abricta* as suggested by Boulard (1979, 1990). Species no longer considered as belonging to *Abricta* are listed and will be transferred to other genera in a forthcoming work (Moulds, in prep).

Abbreviations used for names of collectors are as follows: AMW-H, A. & M. Walford-Huggins; GAD, G. & A. Daniels; MBM, Max & Barbara Moulds. Abbreviations for depositories of specimens are as follows: AE, collection of A. Ewart, Brisbane; AM, Australian Museum, Sydney; ANIC, Australian National Insect Collection, Canberra; ASCU, Agricultural Scientific Collection Unit, NSW Agriculture, Orange; BMNH, The Natural History Museum, London (also known as British Museum of Natural History); DPIB, Department of Primary Industries, Boroka; JM, collection of J. Moss, Brisbane; JO, collection of J. Olive, Cairns; K, Australian Museum registration numbers are prefixed “K”; LG, collection of L. Greenup, Sydney; LP, collection of L. Popple, Brisbane; MC, collection of M. Coombs, Brisbane; MM, Macleay Museum, University of Sydney; MNHP, Museum National d’Histoire Naturelle, Paris; MSM, author’s collection; MV, Museum of Victoria, Melbourne; NMC Nationalmuseet, Copenhagen; NTM, Northern Territory Museum of Arts and Science, Darwin; OUM, Oxford University Museum, Oxford; PH, collection of P. Hutchinson, Perth; QM, Queensland Museum, Brisbane; RE, collection of R. Eastwood, Brisbane; SAM, South Australian Museum, Adelaide; UQIC, University of Queensland Insect Collection, St Lucia, Brisbane; UZMC, Universitets Zoologiske Museum, Copenhagen; WAM, Western Australian Museum, Perth; ZMH, Zoologischen Museen, Hamburg. Standard abbreviations are used for frequently used words, for example, creek (Ck), crossing (x-ing), homestead (Hsd), mile or miles (mi), near (nr), river (R.) and the cardinal points.

Botanical nomenclature follows Bailey *et al.* (1976) and Henderson (1997).

Terminology of cicadoid imago structures, for the most part, follows Kramer (1950) and Moulds (1990); wing venation is based on that of Dworakowska (1988) (Figs. 1, 2).

Terminology of male genitalia follows Orian (1964) for structures of the aedeagus while terminology for the pygofer is adapted from Duffels (1977, 1983) and Dugdale (1972) (Figs. 3–6). Two new structures, both apparently unique to the *Abricta* complex and associated with the aedeagus, are recognized here. A membranous transverse lobe positioned ventrally near the apex of the theca I call the flabellum (from the Latin meaning a fan, neuter) and a lightly sclerotized flap attached to the ventral side of the theca, proximal to the flabellum, I call the palearis (from the Latin for dewlap; neuter). The function of both these structures is unknown but they provide significant taxonomic characters at the species level.

Historical review

Abricta was erected by Stål (1866) as a subgenus of *Tibicen* Latreille to accommodate *Tettigonia brunnea* Fabricius, *Cicada tephrogaster* Boisduval and his new species *ferruginosus*. Three further species were added by subsequent authors before Karsch (1890) raised *Abricta* to generic rank, although the choice of *brunnea* as the type species for *Abricta* was made by Distant (1905a) who simultaneously described two additional species.

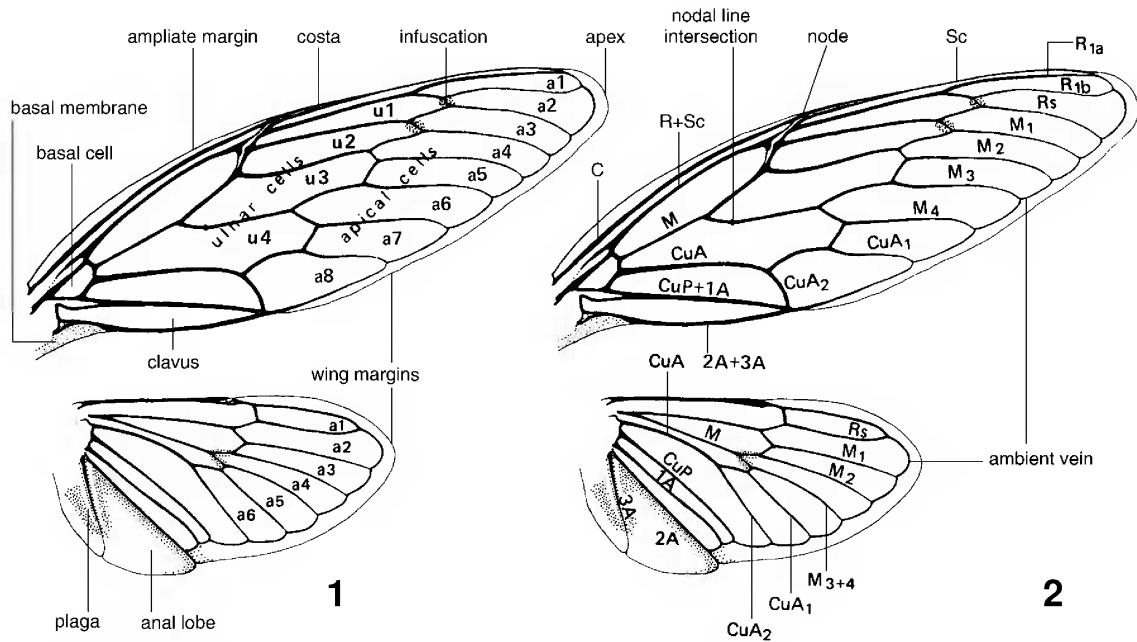
The first monograph of Australian cicadas (Goding & Froggatt, 1904) failed to recognize *Abricta* at generic rank, using *Tibicen* instead. Goding and Froggatt included a potpourri of 19 Australian species in *Tibicen*, of which eight were described as new. In 1906 W.L. Distant published his synonymic catalogue of cicadas (Distant, 1906), which corrected many wrong generic placements of previous authors, including a number of those introduced by Goding and Froggatt. Distant listed 12 species in *Abricta* (nine from Australia, two from Mauritius and one from Guatemala) plus six species he tentatively placed in *Abricta*. In his catalogue, under the heading “Synopsis of Genera” for his Division Taphuraria (p. 128), Distant provided a clear summary of *Abricta* characters, the first assessment of the taxon since Stål’s original (and very brief) description. A partial review of genitalic structures of *Abricta ferruginosa* was later provided by Orian (1964), and Boulard (1979, 1990) has compared *Abroma* Stål and *Abricta*. There has been no further assessment of *Abricta* apart from a recent brief statement in Moulds (1990).

Z.P. Metcalf’s (1963) catalogue of world Homoptera covered available literature to 1955 and listed 19 species of *Abricta*. Burns’ (1957) checklist of Australian cicadas listed 14 Australian *Abricta* species, while Metcalf listed 13 from Australia. Burns had overlooked the transfer of *hirsuta* Goding & Froggatt to the genus *Diemeniana* Distant by Hardy (1918). Burns also listed the junior homonym *aurata* Walker instead of its replacement name *euronotiana* Kirkaldy. The year following publication of his checklist, Burns (1958) revised the genus *Diemeniana* and transferred *Abricta euronotiana* (having realized the homonymy of *aurata*) to the genus *Diemeniana*.

In 1962 Dlabola described a new species of *Abricta*, the first in 42 years. This fell, however, as a junior synonym of *Monomatapa insignis* Distant (Boulard, 1980).

Duffels & van der Laan (1985) listed 17 *Abricta* species, having eliminated *flava* Goding & Froggatt which Burns (1957) had included doubtfully in *Abricta*. The number of species in *Abricta* was further diminished by Boulard (1988) who transferred *flavoannulata* Distant to *Kanakia* Distant.

By 1990 16 species remained in *Abricta*. After examining the types of most Australian species, I concluded that another species, *frenchi* Distant, also belonged to *Diemeniana* and that *Abricta elseyi* Distant was a junior synonym of *Abricta rubra* (Goding & Froggatt). Thus 14 species remained in the genus (Moulds, 1990). However, at that time I was unable to assess the status of three further Australian *Abricta* species: *borealis* (Goding & Froggatt), *burgessi* Distant and *occidentalis* (Goding & Froggatt); nor did I assess non-Australian species then placed in *Abricta* apart from the type species, *brunnea* Fabricius.



Figs. 1–2. Simplified diagrams showing principal wing features of *Aleeta curvicosta*: (1) fore and hind wings showing wing areas and features; (2) fore and hind wings showing venation. Terminology adapted from Kukulová-Peck (1983), Boulard (1996) and Dworakowska (1988). A, anal vein; a, apical cell; C, costal vein; CuA, cubitus anterior vein; CuP, cubitus posterior vein; M, median vein; R, radius; Sc, subcostal vein; u, ulnar cell.

Species incorrectly assigned to *Abricta*

The following species do not fall within *Abricta* complex of genera and are excluded from this revision.

***Tibicen borealis* Goding & Froggatt, 1904**, described from King George's Sound, Western Australia, was tentatively transferred to *Abricta* by Distant (1906). Syntype male in ANIC (ex MM) (Hahn, 1962; Stevens & Carver, 1986) (examined). This species clearly lacks characters of the *Abricta* complex and is to be placed in a new genus (Moulds, in prep.).

***Abricta burgessi* Distant, 1905**, described from near Ingham, Queensland, has remained in *Abricta* since its description (Distant, 1905a). Syntype male in BMNH (examined). This species clearly lacks characters of the *Abricta* complex and will be so treated in a forthcoming work (Moulds, in prep.).

***Tettigonia cincta* Fabricius, 1803**, described from New Cambria (= Australia), was tentatively transferred to *Abricta* by Distant (1906). This species clearly lacks characters of the *Abricta* complex and will be treated in a forthcoming work (Moulds, in prep.).

***Tibicen occidentalis* Goding & Froggatt, 1904**, described from Western Australia, was placed in *Abricta* by Distant (1906). Holotype male in ANIC (ex MM) (Hahn, 1962; Stevens & Carver, 1986) (examined). This species lacks characters of the *Abricta* complex and is to be placed in a new genus (Moulds, in prep.).

Tettigonia pusilla* Fabricius, 1803, *nomen dubia was tentatively transferred to *Abricta* by Distant (1906). Type female in UZMC (ex University of Kiel collection) (Zimsen, 1964) (examined). The specimen does not have a locality label—just a slip of paper with the word “*pusilla*”, probably in Fabricius' handwriting.

Fabricius (1803) records this species from Amboina (= Ambon) in the Moluccas. J.P. Duffels & A.J. De Boer (pers. comm.) know Moluccan cicadas well and believe it does not come from the Moluccas. I am also certain it is not of Australian or New Zealand origin. Atkinson (1886) listed *pusilla* amongst “Species of doubtful position” recording it from Amboina and India. In the absence of any other Indian record and Atkinson's expression of doubt concerning its presence there, it seems reasonable to also dismiss India as a place of origin for this species.

The specimen clearly does not belong to *Abricta* or allied genera; the fore wing costa is not dilated and the build of the body is slender. At first glance it appears to belong to the Cicadettini but fore wing veins M and CuA remain unfused. Without an associated male it is impossible to determine its true identity or placement, and it is here treated as a *nomen dubia*.

Cladistic analyses

Outgroup choice. Classification of the Cicadidae is still based, to a considerable degree, upon the arrangement proposed by Distant (1906). Generic relationships remain little understood and locating the sister groups of *Abricta* and its allied genera has been somewhat a hit-and-miss exercise. Boulard (1979, 1990) discussed the close

relationship of *Abricta* with *Abroma* Stål and suggested that they could even be synonymous; he also mentioned the similarity of *Trismarcha* Karsch with *Abricta*. Further, Boulard (1980) discussed the similarity of *Monomatapa* Distant to *Abricta*. Thus, *Abroma*, *Monomatapa* and *Trismarcha* were all considered as potential outgroups. However, examination of the type species of *Abroma*, *Abricta*, *Monomatapa* and *Trismarcha* showed closest similarities between *Monomatapa*, *Abroma* and *Abricta*; *Trismarcha* was much less similar. For this reason *T. umbrosa* Karsch (Fig. 39) (the type species of *Trismarcha*) was chosen as the outgroup and *Monomatapa insignis* Distant and *Abroma guerinii* (Signoret) (also type species of their genera) were incorporated as part of the ingroup. Additional species of *Abroma*, *Monomatapa* and *Trismarcha* were omitted because of uncertainties of their generic placements.

Characters. From a detailed study of morphology 24 characters were selected for use in the cladistic analyses. Fourteen characters are binary and ten 3-tier multistate. Morphology, apart from male genitalia, showed comparatively few differences among the species under study. Over half the characters, 13 of the 24, were obtained from male genital structures. Female genitalia showed only one character sufficiently different among species to provide useful data. The characters and character states used were as follows.

Head

Character 1: *Head width/anterior pronotum width ratio*

- (0) >1.1
- (1) 0.9–1.1
- (2) <0.9

Character 2: *Eye size*

- (0) average (distance between them much greater than half total head width)
- (1) large (distance between them half or less of total head width)

Thorax

Character 3: *Pronotum to mesonotum colour*

- (0) unicolorous
- (1) bicolorous

Male opercula

Character 4: *Male opercula*

- (0) meeting or very nearly meeting
- (1) clearly separated

Tymbals

Character 5: *Number of tymbal ridges*

- (0) 8 (Figs. 8, 21)
- (1) 9–14 (Figs. 19, 20, 22–29)

Wings

Character 6: *Fore wing costa*

- (0) weakly dilated
- (1) strongly dilated to node

Character 7: *Fore wing anal angle*

- (0) clearly defined; wing margin strongly bent at apical cell 8
- (1) ill defined; wing margin nearly straight at apical cell 8

Character 8: *Fore wing infuscation*

- (0) absent or present on bases of apical cells 2 and 3
- (1) continuous along bases of apical cells 2–4

Abdomen

Character 9: *Width of male abdomen*

- (0) broader than thorax
- (1) equal to thorax

Character 10: *Abdominal pubescence*

- (0) golden
- (1) silver

Male genitalia

Character 11: *Upper pygofer lobe length*

- (0) very short
- (1) much shorter than dorsal beak
- (2) equal to or longer than dorsal beak

Character 12: *Upper pygofer lobe apex*

- (0) rounded
- (1) straight and pointed
- (2) upturned and pointed

Character 13: *Secondary upper pygofer lobe*

- (0) absent
- (1) present

Character 14: *Basal pygofer lobe*

- (0) small and rounded
- (1) bluntly pointed and webbed
- (2) bluntly pointed and finger-like

Character 15: *Secondary basal pygofer lobe*

- (0) absent
- (1) present

Character 16: *Distal end of uncal lobe*

- (0) downturned
- (1) upturned

Character 17: *Uncal lobe shape*

- (0) claw-like (Fig. 32)
- (1) disc-like (Fig. 6)
- (2) scoop-like (Fig. 4)

Character 18: *Uncal lateral process*

- (0) absent
- (1) short and rounded
- (2) linear and nearly equal in length to upper pygofer lobe

Character 19: *Palearis*

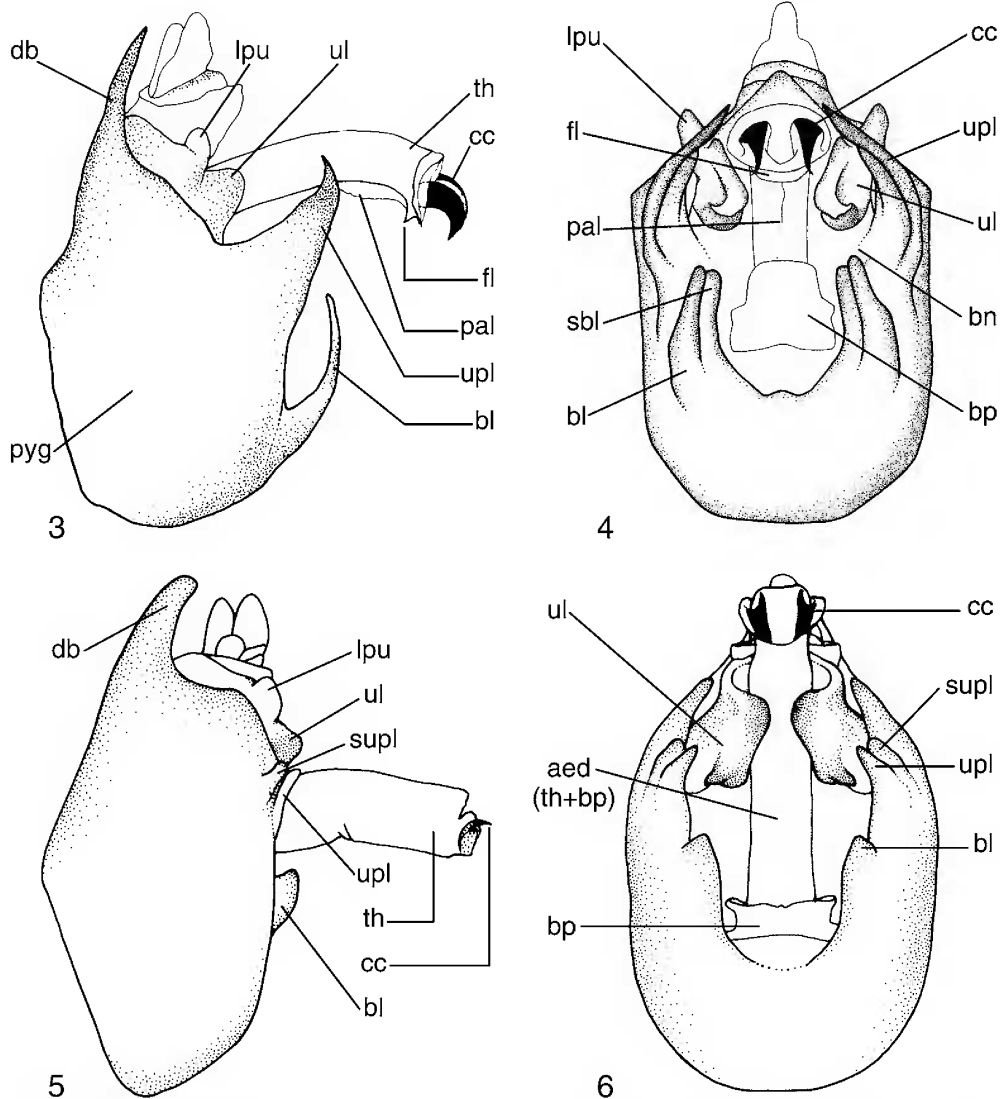
- (0) absent
- (1) small and lobe like
- (2) linear and extending at least one quarter length of theca

Character 20: *Flabellum*

- (0) absent
- (1) small and bilobed
- (2) expanded, ovate

Character 21: *Conjunctival claw development*

- (0) absent
- (1) robust, claw-like with no associated sclerotization (Figs. 3, 4)



Figs. 3–6. Male genitalia of *Tryella ochra* (3,4) and *Abroma guerinii* (5, 6); lateral views at top, ventral views at bottom. Terminology after Duffels (1977), Dugdale [1972] and Orian (1964). Abbreviations: *aed*, aedeagus; *bl*, basal lobe of pygofer; *bn*, basal knob of median rib of upper pygofer lobe; *bp*, basal plate; *cc*, conjunctival claw; *db*, dorsal beak; *fl*, flabellum; *lpu*, lateral process of uncus; *pal*, palearis; *pyg*, pygofer; *sbl*, secondary basal lobe of pygofer; *supl*, secondary upper pygofer lobe; *th*, theca; *ul*, uncal lobe; *upl*, upper lobe of pygofer.

- (2) fused with, or adjoining, a basolateral sclerotization (Figs. 5, 6)

Character 22: *Conjunctival claw orientation*

- (0) ventral
(1) lateral

Character 23: *Conjunctival claw apex*

- (0) simple
(1) complex

Female genitalia

Character 24: *Ovipositor apex in lateral view*

- (0) short, rounded (Fig. 7)
(1) long, with strong dorsal downward slope (Fig. 8)
(2) long, with modest ventral and dorsal slopes (wedge shaped) (Figs. 9–14)

Discussion of characters

Head. The species of the *Abricta* complex of genera all possess a broad head compared to most other cicadas and a postclypeus that is only weakly convex at its anterior margin so that it is almost continuous with the anterior margins of the vertex lobes. This is so even for *Tryella crassa* n.sp. and *T. graminea* n.sp., which are the only species in which the head is narrower than the anterior pronotum (character state 1.2). The head width of all other Australian species of the *Abricta* complex is about equal to that of the anterior pronotum (1.1) while the head is distinctly wider in all non-Australian taxa (1.0).

The Afrotropical *Abricta* and *Abroma* species possess enlarged eyes which tend to dominate the head (character state 2.1), while other Australian species of the *Abricta* complex of genera have eyes of more or less normal size (2.0). The rostrum length of all species is remarkably similar, reaching to somewhere between the distal ends of the mid and hind coxae. Head colour is either black, brown or more

often a combination of both. Both rostrum length and head colour have been considered unsuitable characters for inclusion in the cladistic analysis because they lack definable states.

Thorax. Thoracic morphology shows little diversity throughout the *Abricta* complex of genera. The pronotal collar is depressed and fused laterally although the rounded lateral angles are moderately developed.

Colour tonal contrast between the pronotum and mesonotum is a reasonably stable diagnostic character (character 3). The Neotropical species *Chrysolasia guatemalena* has a unicolorous thorax, along with five Australian species. All of the Afrotropical species examined, *Monomatapa insignis*, *Abricta brunnea*, *A. ferruginosa* and *Abroma guerinii*, plus the remaining ten species of the *Abricta* complex from Australia, are bicolorous with the pronotum paler than the mesonotum. Only *Tryella stalkerii* was found to include some individuals tending unicolorous rather than bicolorous. Other colour patterns and colours were found to be too inconsistent within species and were not used in the cladistic analysis.

Male opercula. The opercula of *Abricta* and allied genera are nearly flat, distally rounded plates that cover the tympanal cavities. For the most part they are confined within, or just beyond, the limits of the tympanal cavities; only in *Aleeta curvicosta* do they extend noticeably beyond, both distally and laterally. Moderate differences in size are reflected by the opercula either meeting or not meeting (character 4). Opercula colour ranges from muddy pale yellow to black but the considerable range of variation encountered in most species excludes opercula colour from being a satisfactory diagnostic character.

Male tymbals. Tymbal morphology throughout *Abricta* and its allied genera is very similar. A series of long, nearly parallel ribs dominate the tymbal and the basal plate is always small (Figs. 18–29). The number of ribs varies between species from 8 to 14 (character 5). Conspecific deviation by one or two ribs is sometimes encountered in some species. The Afrotropical species, *Abricta brunnea*, *A. ferruginosa* and *Abroma guerinii*, normally have 10–14 ribs (Fig. 19), the Australian *Aleeta curvicosta* normally has 12 (Fig. 20) while the Australian *Tryella* species and the African *Monomatapa insignis* have 9–11 (usually 10) (Figs. 22–29) and the Neotropical *Chrysolasia guatemalena* 8 (Fig. 21). The outgroup taxon *Trismarcha umbrosa* from Africa also has 8 (Fig. 18). Because of the variation encountered in the number of ribs within *Abricta*, *Abroma*, *Aleeta* and *Tryella*, scoring of these genera has been categorized as 9 or more ribs.

Wings. Wing morphology is similar to that found in many other cicadas. Two useful morphological characters have been identified for *Abricta* and its allied genera. The fore wing costa (character 6) shows marked dilation in all Australian species (6.1). There is also a tendency for other species of the *Abricta* complex of genera to show fore wing costal dilation but it is minimal compared with that of Australian species. Fore wing shape (character 7) of Australian species of the *Abricta* complex also differs from non-Australian species of the complex; the anal angle of Australian species complex being substantially lost (7.1).

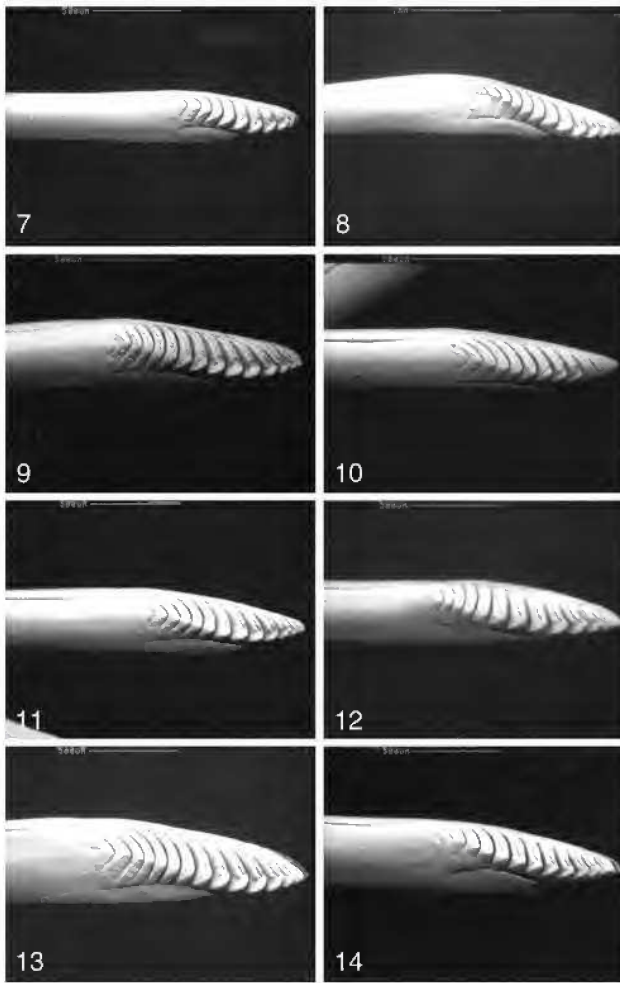
Fore wing infuscation (character 8) varies considerably, both between species and within some species. The most extensive infuscation, continuous along the bases of apical cells 2–4 (8.1), is found in *Tryella noctua* (Distant), *T. occidentis* n.sp. and *T. stalkerii* (Distant) from Western Australia plus *T. infuscata* n.sp. from the Northern Territory and northwestern Queensland. Such infuscation is always present between apical cells 2–4. Three other *Tryella* species, *T. kauma* n.sp., *T. ochra* n.sp. and *T. lachlani* n.sp., all from Queensland, plus all non-Australian species of the *Abricta* complex of genera, totally lack fore wing infuscation. The eight remaining species (all from Australia) have infuscation that is confined to the bases of apical cells 2 and 3 only. However, the extent of this infuscation is highly variable in most of these species; the majority of individuals have an infuscation that is subdivided, some have continuous infuscation and some individuals of some species lack infuscation altogether. While this range of variation is evident in all species, extremes are uncommon except in *Tryella castanea* Distant. Because of the variable nature of infuscations in these species a distinction has not been made between the presence of these small infuscations and their absence.

Male abdomen. The width of the male abdomen (character 9) is equal to that of the thorax (9.1) in all species except *Chrysolasia guatemalena* and *Monomatapa insignis*. Overall abdominal shape is similar for most species with the basal segments showing minimal taper.

Distinct pubescence on the abdomen (and often also on head, thorax, legs and basal wing veins) (character 10) is a typical feature of all species of the *Abricta* complex. The Australian species all carry a very fine “powder-like” silver pubescence, especially *Aleeta curvicosta*, *Tryella rubra*, *T. occidentis* and *T. noctua* (10.1). However, this pubescence is often partly or entirely abraded. *Abricta brunnea* and *A. ferruginosa* from Mauritius plus *Abroma* species appear to carry similar pubescence but it was not obvious on those specimens I have examined, probably because all have been old and worn. By contrast, *Chrysolasia guatemalena* has prominent pubescence which is clearly hair-like and is not easily abraded, and is of a distinct golden colour on the abdomen (10.0). The outgroup taxon, *Trismarcha umbrosa*, is the only other species under study that possesses such golden pubescence.

Male genitalia. The upper pygofer lobes show considerable specific differences both in size and shape (character 11). In their extremes they are either very short as in the Afrotropical *Abricta brunnea*, *A. ferruginosa*, *Abroma guerinii* and *Monomatapa insignis* plus the Neotropical *Chrysolasia guatemalena* (11.0), or strongly developed as in all Australian species of the *Abricta* complex (11.2) except *Aleeta curvicosta* and *Tryella occidentis* (11.1). The distal ends of these structures (character 12) are either rounded as in most Australian species and the *Abricta* species, *Abroma guerinii* and *Monomatapa insignis* (12.0), straight and pointed as in *Chrysolasia guatemalena* (12.1), or upturned and pointed as in the remaining Australian species of the *Abricta* complex (12.2). These states of character 12 only in part support monophyletic groupings but are important diagnostic tools at the species level.

Secondary upper pygofer lobes (character 13) are restricted to the Afrotropical species *Abricta brunnea*, *A. ferruginosa* and *Abroma guerinii*.



Figs. 7–14. Distal end of female ovipositor in lateral view: (7) *Trismarcha umbrosa*, Boukoko, Republic of Central Africa; (8) *Aleeta curvicosta*, Kuranda, northern Qld; (9) *Tryella burnsi*, Kuranda, northern Qld; (10) *T. castanea*, Waterhouse R., NT; (11) *T. kauma*, East Haydon, northern Qld; (12) *T. lachlani*, “York Downs”, northern Qld; (13) *T. rubra*, Waterhouse R., NT; (14) *T. stalkerii*, De Grey R., WA.

The basal pygofer lobes (character 14) show three distinct states, considered most derived when finger-like in seven of the 15 Australian species of the *Abrieta* complex (14.2). This lobe is small and rounded (14.0) in the Mauritian species *Abrieta brunnea* and *A. ferruginosa*, while it is distinctly webbed (14.1) in the Afrotropical *Abroma guerinii* and *Monomatapa insignis*, the Neotropical *Chrysolasia guatemalena*, and the remaining Australian species of the *Abrieta* complex. The development of these lobes in part supports monophyletic groupings and is also an important diagnostic character at species level.

The secondary basal lobes of the pygofer (character 15) are present in all Australian species of the *Abrieta* complex and the Neotropical species *Chrysolasia guatemalena* (15.1) but absent from all Afrotropical species studied (15.0).

The shape of the uncinal lobes is diverse and provides useful diagnostic characters. The distal ends of the uncinal lobes are either downturned as in all the Afrotropical species studied plus the Australian *Aleeta curvicosta*, or upturned as in all *Tryella* species (character 16). Overall shape falls into three distinct categories; claw-like (Fig. 47) as in *Aleeta*

curvicosta and the outgroup *Trismarcha umbrosa*, disc-like (Fig. 6) as in *Abrieta* species, *Abroma guerinii*, *Chrysolasia guatemalena* and *Monomatapa insignis*, and scoop-like (Fig. 4) as in all species of the Australian genus *Tryella* (character 17).

The uncinal lateral processes (character 18) are absent in all Afrotropical species studied and also the Australian species *Aleeta curvicosta*. Intermediate development, in which the processes are short and rounded, occurs five of the Australian *Tryella* species, while linear development is found in the remaining nine Australian *Tryella* species.

A palearis (character 19) occurs in eight of the Australian *Tryella* species but is otherwise unknown in Cicadoidea. In four of these species, *graminea*, *occidens*, *stalkerii* and *willsi* it is small and lobe-like (19.1) but in *infuscata*, *lachlani*, *noctua* and *ochra* it is clearly linear (19.2).

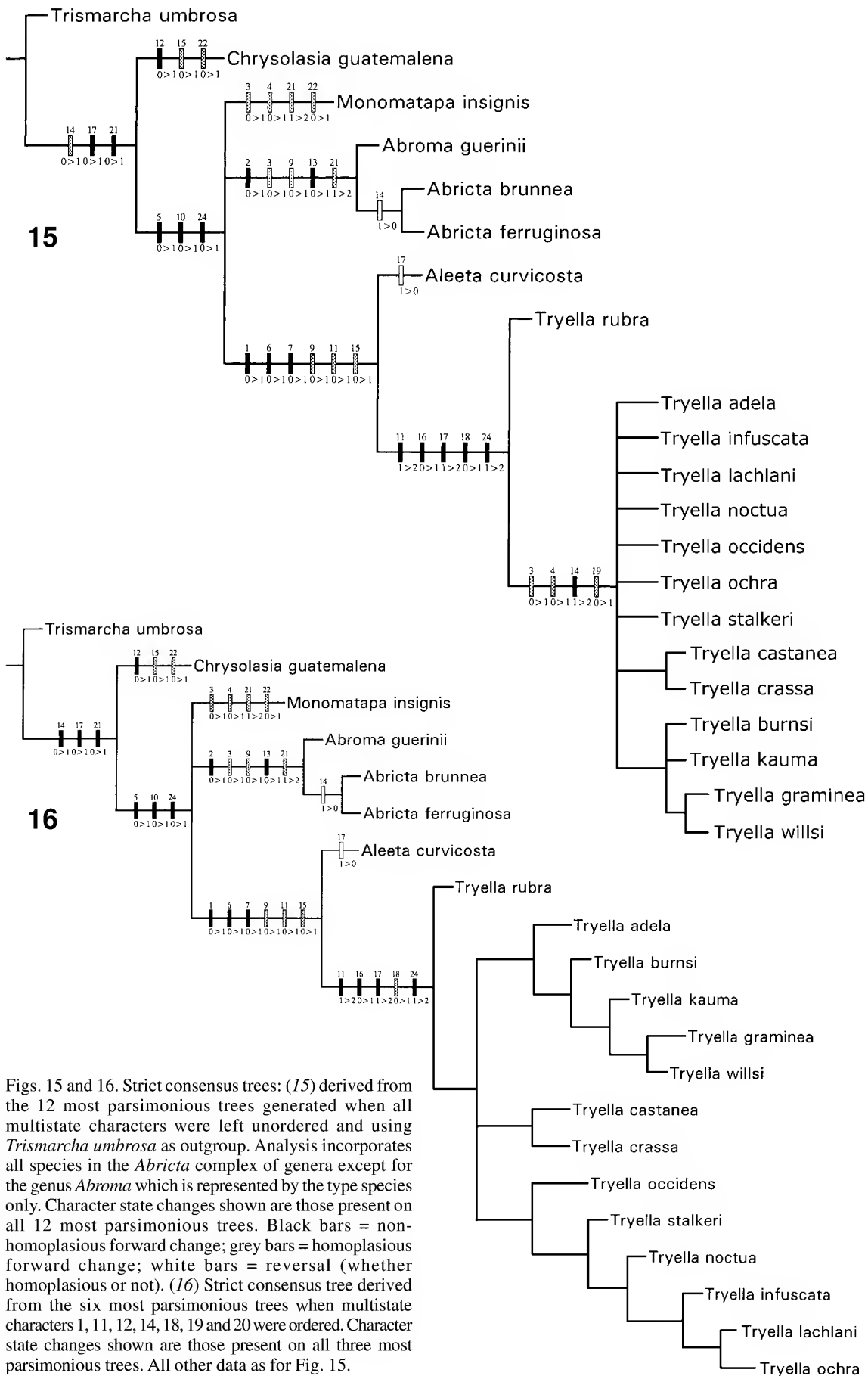
A flabellum (character 20) is found in five Australian *Tryella* species and, like the palearis, is otherwise unknown in Cicadoidea. This membranous structure occurs either as a bilobed flange as in *adela* and *burnsi* (20.1), or as a large ovate flange as in *graminea*, *kauma* and *willsi* (20.2).

The conjunctival claws are unique to *Abrieta* and allied genera. These paired structures show varying degrees of development, orientation and ornamentation, and are useful diagnostic characters both at generic and species levels. Claw development (character 21) falls into two primary groupings; all Australian species of the *Abrieta* complex and *Chrysolasia guatemalena* have robust, cat-like claws with no associated sclerotization (21.1) while the Afrotropical *Monomatapa insignis*, *Abrieta brunnea*, *A. ferruginosa* and *Abroma guerinii* have smaller claws that are associated with a basolateral sclerotization (21.2). Of those species with state 21.1, *Tryella occidens*, *Aleeta curvicosta* and *Chrysolasia guatemalena*, have claws that differ in their detailed structure. *Tryella occidens* has broad, dorsally excavated claws. *Aleeta curvicosta* and *Chrysolasia guatemalena* have claws of a more slender build but which differ significantly from each other in shape, those of *curvicosta* being somewhat flattened laterally, those of *guatemalena* tending to be tubular. These autapomorphies help delineate the genera *Chrysolasia* and *Aleeta*. Claw orientation (character 22) delineates two distinct groupings, those with claws directed either laterally or ventrally. This distinction is clear-cut except for *Tryella occidens* in which the claws are lateral but with a slight upward trend and for *Chrysolasia guatemalena* where the claws are lateral but with a downward trend. The apices of the conjunctival claws (character 23) show complex toothing in *Tryella castanea* and *T. crassa* but in all other species of the *Abrieta* complex they terminate in a simple point.

Female genitalia. Female genital structures showed only one character displaying discernible synapomorphies. Small differences were detected in the apical shape of the ovipositor in lateral view (character 24) (Figs. 7–14).

Computation

The coded character state data given in Table 1 were analysed using the microcomputer programs Hennig86 (version 1.5, Farris, 1989) and PAUP* (version 4.0b10, Swofford, 2000). Employing Hennig86, trees were computed using options m* and bb*. Using PAUP*, a heuristic search was applied. Data were run both with



Figs. 15 and 16. Strict consensus trees: (15) derived from the 12 most parsimonious trees generated when all multistate characters were left unordered and using *Trismarcha umbrosa* as outgroup. Analysis incorporates all species in the *Abricta* complex of genera except for the genus *Abroma* which is represented by the type species only. Character state changes shown are those present on all 12 most parsimonious trees. Black bars = non-homoplasious forward change; grey bars = homoplasious forward change; white bars = reversal (whether homoplasious or not). (16) Strict consensus tree derived from the six most parsimonious trees when multistate characters 1, 11, 12, 14, 18, 19 and 20 were ordered. Character state changes shown are those present on all three most parsimonious trees. All other data as for Fig. 15.

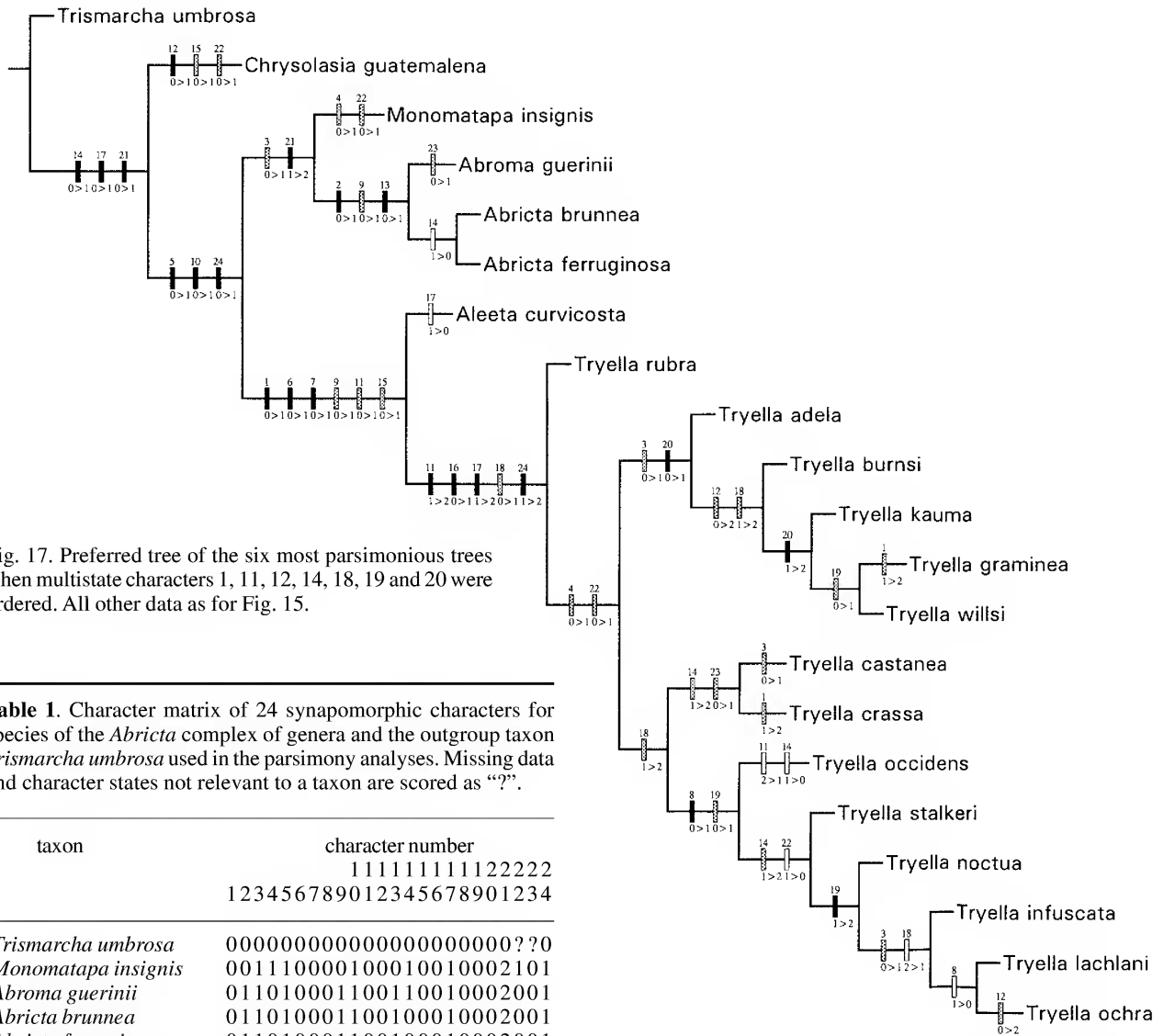


Fig. 17. Preferred tree of the six most parsimonious trees when multistate characters 1, 11, 12, 14, 18, 19 and 20 were ordered. All other data as for Fig. 15.

Table 1. Character matrix of 24 synapomorphic characters for species of the *Abricta* complex of genera and the outgroup taxon *Trismarcha umbrosa* used in the parsimony analyses. Missing data and character states not relevant to a taxon are scored as “?”.

taxon	character number
	1 1 1 1 1 1 1 1 1 1 2 2 2 2 2
	1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4
<i>Trismarcha umbrosa</i>	000000000000000000000000??0
<i>Monomatapa insignis</i>	001110000100010010002101
<i>Abroma guerinii</i>	011010001100110010002001
<i>Abricta brunnea</i>	011010001100100010002001
<i>Abricta ferruginosa</i>	011010001100100010002001
<i>Chrysolasia guatemalena</i>	00000000000101101000110?
<i>Aleeta curvicosta</i>	100011101110011000001001
<i>Tryella adela</i>	101111101120011121011102
<i>Tryella burnsi</i>	101111101122011122011102
<i>Tryella castanea</i>	101111101120021122001112
<i>Tryella crassa</i>	200111101120021122001112
<i>Tryella graminea</i>	201111101122011122121102
<i>Tryella infuscata</i>	101111111120021121201002
<i>Tryella kauma</i>	101111101122011122021102
<i>Tryella lachlani</i>	101111101120021121201002
<i>Tryella noctua</i>	10011111120021122201002
<i>Tryella occidens</i>	100111111110001122101102
<i>Tryella ochra</i>	101111101122021121201002
<i>Tryella rubra</i>	100011101120011121001002
<i>Tryella stalkerii</i>	10?111111120021122101002
<i>Tryella willsi</i>	101111101122011122121102

multistate characters unordered and with characters 2, 11, 12, 14, 18, 19 and 20 ordered. Weighting of characters was not employed. To identify common elements among the equally most parsimonious trees found, consensus trees were computed using the Nelsen option of Hennig86 and the strict consensus option of PAUP*.

Tree files generated from Hennig86 were analysed using CLADOS (version 1.2, Nixon, 1992). Characters were

optimized using the default setting, which favours reversals over parallel developments (ACCTRAN). Rooting of trees to the outgroup from the basal default trichotomy of Hennig86 was achieved using the Move option of CLADOS.

Results and discussion

Processing of the data, using Hennig86 and PAUP*, produced 12 most parsimonious trees of length 53 steps, a CI of 64 and a RI of 82, when all multistate characters were left unordered and autapomorphies excluded. Consensus trees from Hennig86 and PAUP* (applying the strict consensus option) were identical. These consensus trees were fully resolved except for a trichotomy made up of *Monomatapa insignis*, a clade comprising *Abricta* and *Abroma* species, and a clade comprising all Australian species which itself was mostly unresolved (Fig. 15). Re-running the data with multistate characters 1, 11, 12, 14, 18, 19 and 20 ordered gave six trees of length 56, CI 60 and RI 83. A strict consensus tree showed the clade of Australian species almost entirely resolved (in marked contrast to the tree resulting from unordered characters), while the non-Australian taxa remained resolved exactly

as when all multistate characters were left unordered (Fig. 16). Thus, resolution among the Australian species of the *Abricta* complex is dependent upon the hypothesis of the character ordering used while placement of all non-Australian taxa is unchanged whether characters are ordered or not.

The analyses placed *Chrysolasia guatemalena* (from South America) as the sister group of all other species of the *Abricta* complex of genera. These other species were united by three non-homoplasious synapomorphies (characters 5, 10 and 24) and in turn were divided into a trichotomy of two African clades and a clade of Australian species. In the preferred tree resulting from when characters were ordered (Fig. 17) the African species are a monophyletic group supported by one non-homoplasious synapomorphy (21.2) and one homoplasious synapomorphy (3.1). The Australian clade was supported by three non-homoplasious synapomorphies (1.1, 6.1 and 7.1) and three homoplasious synapomorphies (9.1, 11.1 and 15.1).

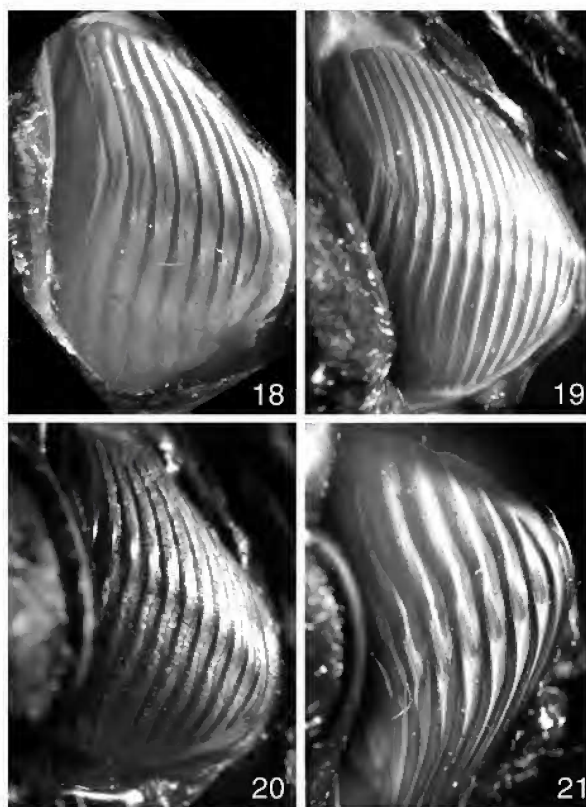
Within the Australian clade, *Aleeta curvicosta* formed a sister group to all remaining species. The sister group of *curvicosta* was strongly supported by four non-homoplasious synapomorphies (11.2, 16.1, 17.2 and 24.2) and one homoplasious synapomorphy (18.1).

Among the 14 species making up the sister group of *curvicosta* (the genus *Tryella*) four groupings were identified: *rubra* as the sister group of all others (so placed in all analyses done, Figs. 15–17); the *occidens* species group containing *occidens*, *stalkerii*, *noctua*, *infuscata*, *ochra* and *lachlani*; the *adela* species group containing *adela*, *burnsi*, *kauma*, *graminea* and *willsi*, and a clade comprising *castanea* and *crassa* that is weakly associated with the *adela* group. Apart from *rubra*, none of these groupings are strongly supported although they do show relationships that follow logical geographic patterns as discussed below.

Rationale for new taxa

Chrysolasia n.gen.

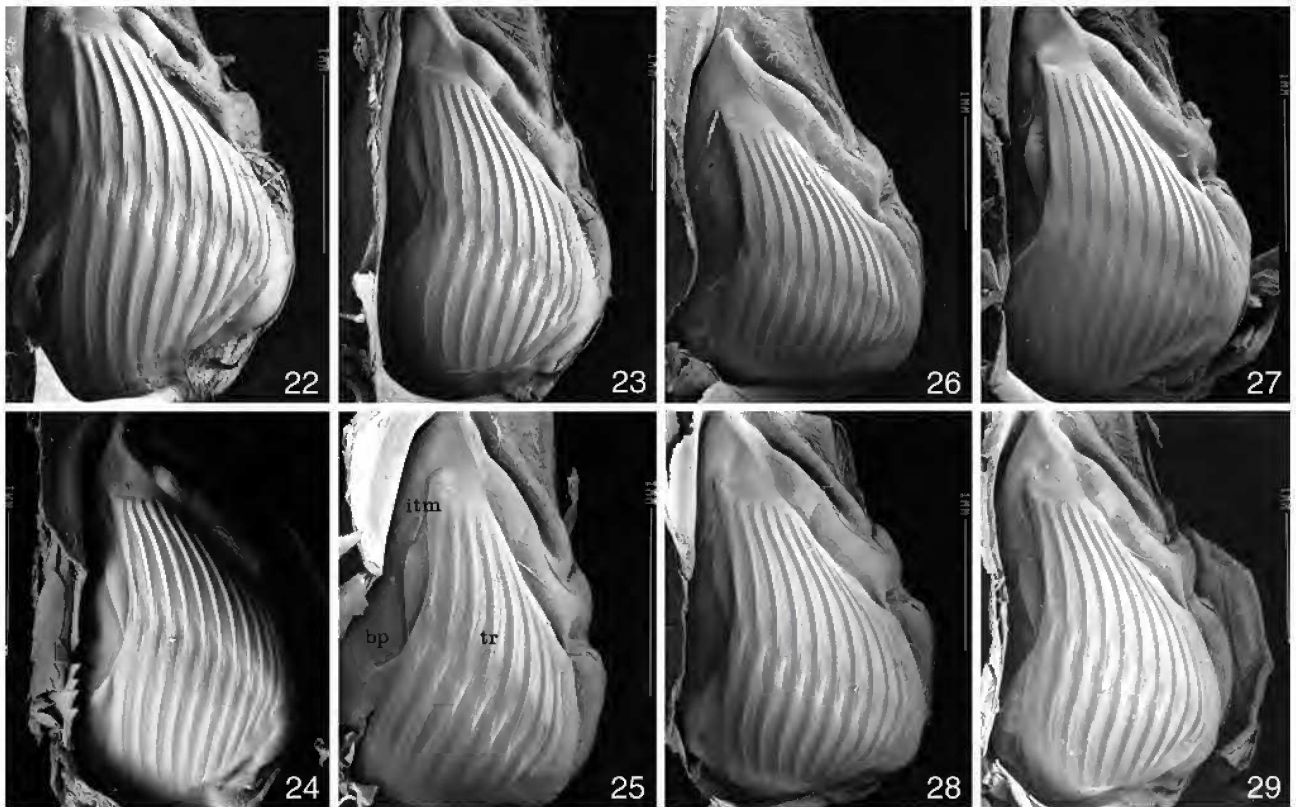
The single Central American species, *Abricta guatemalena*, is phylogenetically distant from other Central American cicadas (J. & M. Heath, pers. comm.) and geographically isolated from other species of the *Abricta* complex of genera, i.e. the Afrotropical *Abricta/Abroma/Monomatapa* species and the Australian species. This geographic separation is reflected in the cladistic analyses by its sister-group relationship with all other species of the *Abricta* group. Three apomorphies support the distinctive nature of *guatemalena*, one non-homoplasious synapomorphies (12.1) and two homoplasious forward changes (15.1 and 22.1) (Figs. 15–17). Further, three non-homoplasious characters (5.1, 10.1 and 24.1) differentiate the sister clade of *guatemalena*. These well supported nodes, in addition to three further autapomorphies for *guatemalena* (golden, hair-like pubescence on the body, apex of upper pygofer lobes straight and pointed, nodal line intersection near midpoint of ulnar cell, and eight tymbal ridges) are considered to provide sufficient justification for the generic separation of *guatemalena* from other species of the complex.



Figs. 18–21. Tymbals of *Trismarcha*, *Abricta*, *Aleeta* and *Chrysolasia* species. (18) *Trismarcha umbrosa*, Boukoko, Republic of Central Africa; (19) *Abricta brunnea*, Mauritius; (20) *Aleeta curvicosta*, Kuranda, northern Qld; (21) *Chrysolasia guatemalena*, Purula, Guatemala.

Abricta s.str.

In the cladistic analyses, the preferred tree (Fig. 17) shows that the Afrotropical *Abricta/Abroma* clade is supported by two non-homoplasious synapomorphies (2.1 and 13.1) and one homoplasious forward change (9.1). The sister clade of *Abricta/Abroma* in the preferred tree (Fig. 17), comprising the Afrotropical monotypic genus *Monomatapa*, is characterized by two homoplasious forward changes (4.1 and 22.1). *Monomatapa insignis* is also differentiated from *Abricta* and *Abroma* by three autapomorphies, its broad male abdomen, linear and tear-drop shaped male opercula and the double-pointed apices of the uncal lobes. All these apomorphies support the generic separation of *Abricta* and *Abroma* from *Monomatapa*. Further, there is clear separation of *Abricta*, *Abroma* and *Monomatapa* from all Australian species of the *Abricta* complex as discussed in Results above. The separation of *Abricta* from *Abroma* is supported by just one homoplasious reversal (14.0). *Abroma guerinii* also differs from *Abricta* by having the conjunctival claws apically bifurcate rather than simple. Both these attributes are relatively minor points of difference and the possible synonymy of *Abricta* and *Abroma*, as suggested by Boulard (1979, 1990), is supported by this evidence. However, synonymy has not been pursued here as a study of all *Abroma* species was not possible. The restriction of *Abricta* as defined here to just two Mauritian species, requires that the Australian species (all of which have been previously placed in *Abricta*) be placed elsewhere.



Figs. 22–29. Tymbals of *Tryella* spp. with rudimentary tymbal covers completely removed to expose basal plates: (22) *Tryella burnsi*, Townsville, northern Qld; (23) *Tryella crassa*, Cloncurry, northern Qld; (24) *Tryella graminea*, Torrens Creek township, northern Qld; (25) *Tryella kauma*, East Haydon, northern Qld. (26) *T. noctua*, Marla, SA; (27) *T. ochra*, Walker Ck, northern Qld; (28) *T. rubra*, Waterhouse R., NT; (29) *T. stalkerii*, De Grey R., WA. Abbreviations: *bp*, basal plate; *itm*, insertion of tymbal muscle; *tr*, tymbal rib.

Aleeta n.gen. and *Tryella* n.gen.

Within the Australian clade the strong differentiation between *curvicosta* and all other Australian species (Figs. 15–17) supports the generic separation of *curvicosta*. This generic separation is further supported by six autapomorphies: male genitalia with beak-like uncal lobes, partially bifurcate upper pygofer lobes, a pair of sublateral flanges near the distal end of the theca and laterally flattened conjunctival claws, plus male opercula that extend clearly beyond the lateral margins of the abdomen. It is proposed here that *curvicosta* be placed in the monotypic genus *Aleeta* n.gen. The sister clade of *curvicosta*, to be proposed here as the genus *Tryella* n.gen., is well supported by four non-homoplasious synapomorphies (11.2, 16.1, 17.2 and 24.2) and one homoplasious forward change (18.1). The generic separation of *Aleeta* and *Tryella* is also supported by electrophoretic analyses which revealed a great genetic distance between *Aleeta curvicosta* and five *Tryella* species that were available for study (Serkowski & Moulds, unpub. data).

Tryella species

Electrophoretic analyses grouped populations of *Tryella* species in a way that was consistent with different male genital morphologies (Serkowski & Moulds, unpub. data). Colour, colour pattern and size were not always consistent within these species groupings suggesting that these features are not necessarily reliable indicators of species limits. Male genital morphologies did, however, correlate with

differences in wing and body morphologies (apart from size) where differences could be discerned. Thus, differences in male genitalic morphology have been given considerable emphasis in delineating *Tryella* species. While the converse is not necessarily true, i.e. individuals with identical male genitalia may not be conspecific, there was no evidence from either electrophoretic data or song analyses (Moulds, unpub. data) suggesting that this might be so.

Biogeography

Distribution of *Abricta* and allied genera. The six genera of the *Abricta* complex fall into distinct geographic regions. *Abricta* sensu str. and *Monomatapa* are strictly Afrotropical in distribution. *Abroma* has an Afrotropical type species but is otherwise widely distributed through Mauritius, Madagascar, Sri Lanka, and possibly India, and doubtfully through southeast Asia, and even South America; special caution should be exercised in including those species of non-Afrotropical origin in *Abroma* as none have been adequately described and further examination is likely to show that some at least do not belong to *Abroma*.

Aleeta and *Tryella* are restricted to Australasia. The sole representative of *Aleeta*, *A. curvicosta*, is endemic to eastern Australia. The 14 known *Tryella* species are also endemic to Australia, except for *T. lachlani* that marginally extends its distribution to the southwest coast of Papua New Guinea. Only two *Tryella* species have distributions that partly impinge on that of *Aleeta*. The distribution of *Chrysolasia* remains uncertain.

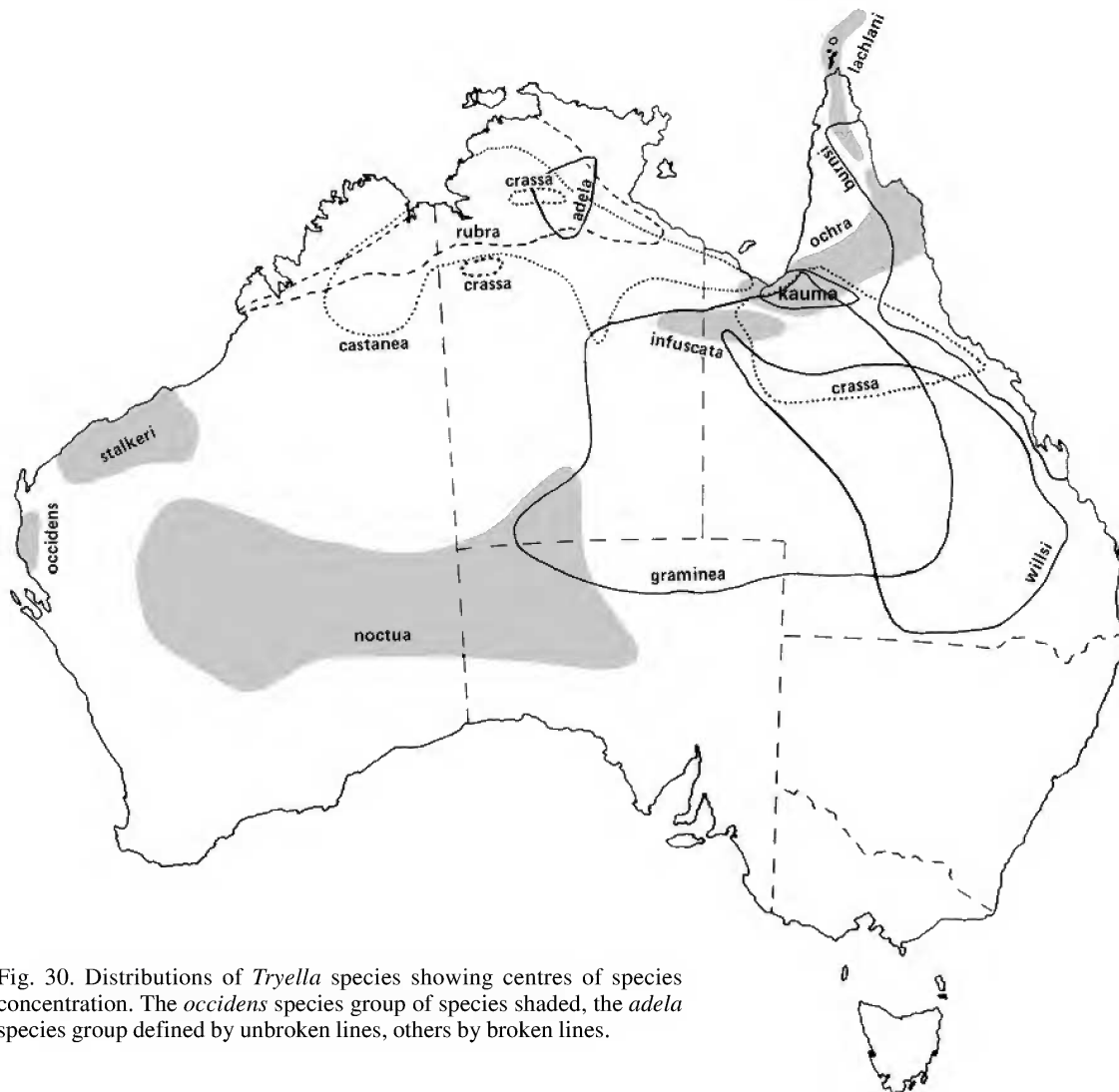


Fig. 30. Distributions of *Tryella* species showing centres of species concentration. The *occidens* species group of species shaded, the *adela* species group defined by unbroken lines, others by broken lines.

Distribution of *Tryella* species (Fig. 30). *Tryella* species occur primarily across the northern half of Australia with just two extending south of 30°S latitude. Most have extensive distributions spanning at least 500 km. The apparent absence of *Tryella* species from Arnhem Land and the Tanami Desert regions of the Northern Territory, and the Kimberley and Pilbara regions of Western Australia is most likely a consequence of insufficient collecting.

The *occidens* species group, comprising *occidens*, *stalkeri*, *noctua*, *infuscata*, *ochra* and *lachlani*, has a distribution that extends from Western Australia northeastwards to Cape York Peninsula. There is a direct correlation between the distribution of these species and their phylogenetic positions from the cladistic analyses (Fig. 17), with the most ancestral species occurring in the far west of Western Australia and the most derived in the north of Cape York Peninsula. The disjunct distributions of the three Western Australian species suggest that they were once far more widespread and have contracted their ranges with changing habitat.

The *adela* species group comprising *adela*, *burnsi*, *kauma*, *graminea* and *willsi*, and the possibly allied species

castanea and *crassa*, is widespread across the monsoonal north of Western Australia, the Northern Territory and Queensland; only *graminea* and *willsi* extend their ranges beyond the monsoonal north to reach the drier interior of the northeast quarter of Australia.

The sister group relationship of *rubra* with the *adela* species group and its allies *castanea* and *crassa* also reflects a western (or northwestern) origin for *Tryella*. The distribution of *rubra* is consolidated across the western limits of the *adela* species group, that is, across the distributions of *castanea*, *crassa* and *adela*. These three species could be interpreted as the three basal taxa of the *adela* species group clade. This distribution pattern supports the hypothesis that the origin of the *adela* group was also somewhere in the west or north-west of the continent and radiated eastward into Queensland, rather than at the base of the Gulf of Carpentaria where the current concentration of species is found. The concentration of species at the base of the Gulf of Carpentaria could be a consequence of the eastward radiations of the *occidens* species group and *adela* species group converging.

Taxonomy

Abricta complex of genera

Five genera are here considered to belong to the *Abricta* complex of genera, viz. *Abricta* Stål sensu str., *Abroma* Stål, *Aleeta* n.gen., *Tryella* n.gen., *Chrysolasia* n.gen. and *Monomatapa* Distant. These genera are characterized by the conjunctival claws at the distal end of the male theca, and a partially or strongly dilated fore wing costa. On the basis of their type species, *Abricta* and *Abroma* should probably be synonymized, a decision not formally adopted here as an assessment of the 18 species of *Abroma* lies beyond the scope of this revision.

Key to genera

- 1 Anterior margin of fore wing strongly dilated proximal of node, the maximum dilation greater than width of costal vein (Fig. 55b) (Australian species) 2
- Anterior margin of fore wing with dilation less than width of costal vein (Fig. 41b) (non-Australian species) 3
- 2 Fore wing rarely less than 32 mm long, usually more than 40 mm; male genitalia with uncal lobes downturned at their distal ends (Figs. 46, 47) (monotypic) *Aleeta* n.gen.
- Fore wing never reaching 32 mm, usually less than 26 mm; uncal lobes upturned at their distal ends (Figs. 100, 101) (14 species) *Tryella* n.gen.
- 3 Abdomen bearing distinct golden pubescence; male genitalia with conjunctival claws well developed and strongly recurved (Figs. 35, 36) (monotypic, reputedly from Guatemala) *Chrysolasia* n.gen.
- Abdomen bearing silver-white or no pubescence; male genitalia with conjunctival claws small, gently curved in an arc (Figs. 33, 34, 37–38, 42–45) 4
- 4 Male abdomen much broader than thorax; male genitalia with conjunctival claws laterally directed (Figs. 33, 34) *Monomatapa* Distant
- Male abdomen as wide as thorax; male genitalia with conjunctival claws ventrally directed (Figs. 37–38, 42–45) 5
- 5 Male with upper pygofer lobes near triangular with apex sharply pointed in lateral view (Figs. 37, 38, 42, 43) (2 species, Mauritius & Reunion) *Abricta* Stål sensu str.
- Male with upper pygofer lobes small, tending linear, apically rounded in lateral view (Figs. 44–45) (18+ species, Mauritius, Madagascar, Sri Lanka, India, and doubtfully Asia, South America, Philippines) *Abroma* Stål

Genus *Abricta* Stål, 1866

Tibicen (*Abricta*) Stål, 1866: 26; Dallas, 1867: 556; Atkinson, 1886: 187; Karsch, 1890: 116; Distant, 1892a: 127 (error); Schulze *et al.*, 1926: 4.

Abricta.—Karsch, 1890: 86, 108, 111; Karsch, 1891: 348; Karsch, 1893: 13; Kirkaldy, 1904: 282; Distant, 1905a: 27; Kuhlitz, 1905: 78–80; Distant, 1906: 130; Froggatt, 1907: 351; Ashton, 1912: 24; Ashton, 1914: 349; Hardy, 1918: 70; Distant, 1920: 456; Delétang, 1923: 629; Handlirsch, 1925: 1116; China, 1929: 426, 427; Kato, 1932: 179, 181; Neave, 1939: 5; Orian, 1954: 235, 236; Tillyard, 1926: 161; Kato, 1956: 62, 69, 84; Dlabola, 1971: 151; Dugdale, 1972: 857; Young, 1973: 378; Fleming, 1975: 300; Popov, 1975a: 34; Popov, 1975b: 288; Richards & Davies, 1977: 184; Simmons & Young, 1978: 43; Boulard, 1979: 31, 33; Duffels & van der Laan, 1985: 233; Moulds, 1990: 118; Moulds & Carver, 1991: 467; Ewart, 1993: 139, 140; Zborowski & Storey, 1995: 87.

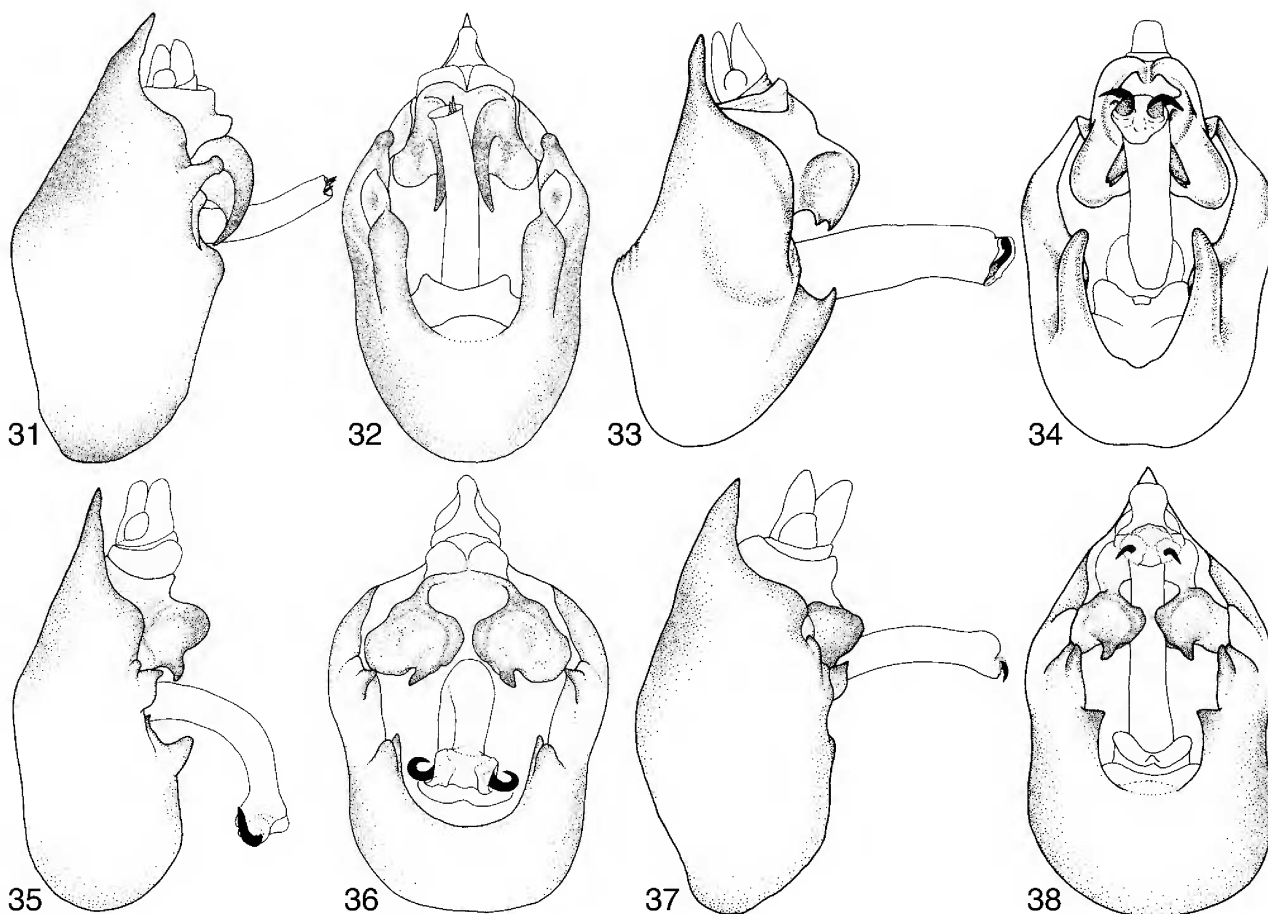
Type species. *Tettigonia brunnea* Fabricius, 1798 (type by subsequent designation).

Stål (1866) included three species in *Abricta* (*brunnea*, *ferruginosa* and *tephrogaster*, the latter in a footnote) without

selecting one as type species. Distant (1905a) was the first to do so, selecting *brunnea*. Under Article 69.1 of the *Code* Distant's designation fixes *brunnea* as type species.

Included species. In its present concept the genus *Abricta* contains only two species: *brunnea* Fabricius and *ferruginosa* Stål.

Diagnosis. Postclypeus slightly to moderately produced. Rostrum almost reaching or slightly passing hind coxae. Eyes large, their long axes together comprising approximately half total width of head. Width of head including eyes greater than width of anterior pronotum and nearly equal to width of mesonotum; width of male abdomen about equal to width of thorax. Pronotal collar narrow with lateral angles ampliate and rounded; rudimentary and essentially confluent with adjoining sclerites anterior of lateral angles. Wings hyaline or with weak translucent tint; without infuscations. Fore wing costal margin weakly ampliate to node, the maximum dilation less than width of costal vein; basal cell usually with translucent pigmentation, hyaline in some individuals. Hind wing plaga broad along vein 3A



Figs. 31–38. Male genitalia of *Trismarcha*, *Monomatapa*, *Chrysolasia* and *Abricta* species showing pygofer with uncus and aedeagus in right lateral view (left) and ventral view (right): (31–32) *Trismarcha umbrosa*, Boukoko, Republic of Central Africa; (33–34) *Monomatapa insignis*, Chiredzi, Zimbabwe; (35–36) *Chrysolasia guatemalena*, Purula, Guatemala; (37–38) *Abricta brunnea*, Mauritius.

and inner margin of anal lobe but never reaching distal end of 3A, absent or barely present along 2A. Tymbals with 11–14 long ribs evenly spaced and slightly converging dorsally; basal plate small (Fig. 19). Male opercula almost tear-drop in shape, weakly angled inwards before midpoint; nearly flat; meeting but not overlapping and extending distally to margin of tympanal cavities. Body and basal fore wing veins with some silver pubescence, probably extensive on newly emerged individuals.

Male genitalia (Figs. 37, 38, 42, 43) with pygofer dorsal beak large, long and pointed; upper pygofer lobes well developed, pointed and highly sclerotized, lacking setae; secondary upper pygofer lobes rounded, bearing long setae; pygofer basal lobes undivided, moderately developed, triangular in ventral view, bearing long setae. Uncal lobes disc-like, tending towards meeting but never doing so, each terminating in a thick-set, down-turned, blunt projection; uncal lateral processes absent. Aedeagus in lateral view straight or gently curved for most of its length but strongly recurved near base, basal plate a fused pair of nearly circular discs; conjunctival claws directed ventrally, simple, arising from inner surface of a large lateral basal flange; flabellum and palaris absent.

Female abdominal segment 9 very long, clearly more than half as long as abdominal remainder, nearly conical; ovipositor sheath terminating beyond distal end of dorsal beak.

Distinguishing features. The disc-like male uncal lobes combined with the reduced conjunctival claws clearly

separate *Abricta* and *Abroma* from *Tryella* n.gen., *Aleeta* n.gen. and *Chrysolasia* n.gen. Further, the weak ampliation of the fore wing costa of *Abricta* and *Abroma* immediately distinguishes these genera from *Aleeta* and *Tryella* in which the maximum ampliation at least equals the width of the costal vein. *Abricta* and *Abroma* are readily distinguished from *Monomatapa* by having the male opercula nearly parallel-sided, rounded and meeting or almost meeting rather than tending linear and tear-drop shaped and clearly separated, the width of the male abdomen being equal to that of the thorax rather than notably wider, and the apices of the uncal lobes simply pointed rather than double-pointed.

Differentiation from *Abroma* is relatively subtle; the conjunctival claws of *Abroma guerinii*, the type species of *Abroma*, are apically bifurcate rather than simple and the pygofer basal lobes are more developed.

Remarks. My limited study of *Abroma* supports Boulard's (1979, 1990) suggestion that *Abricta* and *Abroma* may be synonymous. However, a full appraisal of all *Abroma* species should be undertaken, and this falls beyond the limits of this study; consequently the synonymy of *Abricta* and *Abroma* will not be pursued here.

Distribution. Restricted to the islands of Mauritius and Reunion.

Behaviour. Unconfirmed reports (O. Griffiths, pers. comm.) say adult males perch head down.

Key to species of *Abricta* s.str.

- 1 A large species, width of head including eyes exceeding 10 mm (Mauritius) *ferruginosa* Stål
 — A medium to small species, width of head including eyes never greater than 9 mm (Mauritius and Reunion Islands) *brunnea* (Fabricius)

***Abricta brunnea* (Fabricius, 1798)**

Figs. 19, 37, 38, 40a,b

Tettigonia brunnea Fabricius, 1798: 517; Fabricius, 1803: 18, 43; Donovan, 1820: [4]; Zimsen, 1964: 291.
Cicada brunnea.—Germar, 1830: 42; Burmeister, 1835: 182; Walker, 1850: 230; Dohrn, 1859: 75.
Tibicen brunnea.—Stål, 1861: 618.
Tibicen (Abricta) brunneus.—Stål, 1866: 26; Atkinson, 1886: 187; Distant, 1892a: 131; Kirby, 1893: 178; Melichar, 1904: 26.
Tibicen brunneus.—Stål, 1870: 8; Atkinson, 1885: 157; Atkinson, 1886: 188.
Abricta brunnea.—Karsch, 1890: 121; Karsch, 1891: 348; Distant, 1905a: 27; Distant, 1906: 130; Orian, 1954: 235; Orian, 1956: 651; Mamet, 1957: 73; Metcalf, 1963: 205–206; Boulard, 1979: 28–30, 31, 33, 35, 44, 45; Duffels & van der Laan, 1985: 234; Boulard, 1990: 209, 210.

Types. Two presumed syntype males (UZMC, ex University of Kiel collection), one labelled “*brunnea*” (apparently in Fabricius’ hand) and “TYPE” (red, machine-printed label); the other specimen is unlabelled.

Lectotype designation. Fabricius (1798) described this species without stating the number of specimens examined, recording only the locality and collector as “in Isle de France Dom. Daldorff”. However, five years later Fabricius (1803) listed two specimens as being in his collection at the University of Kiel. Zimsen (1964) listed both specimens as now being in UZMC (see above). It is reasonable to assume that Fabricius may have based his description on both these specimens. To clarify the identity of the species and follow the apparent intentions of Fabricius the male labelled “Type” is here designated lectotype and the other paralectotype.

Material examined. Type as above and the following. MAURITIUS: 1♀, 1837, Desjardins; 1♂, 1838, Desjardins; 1♂, 1901, Ch. Alluaud; 1♂, 60, Ray. MAMET, Coll. R. Mamet; 1♂, Reduit, R. Mamet, Coll. R. Mamet (all labelled Ile Maurice and det. Michel Boulard, 1978) (MNHP).

Description

Male (Figs. 19, 37, 38, 40a). *Head.* Black or nearly black but sometimes partly dark ferruginous, usually with a small ochraceous spot on dorsal midline against posterior margin. Postclypeus glossy black with a narrow muddy pale yellow margin extending sometimes partially to dorsal region. Anteclypeus glossy black. Rostrum black with basal region brown or dull yellow; reaching bases of hind coxae. Antennae brown to nearly black. Bearing some indistinct silver pubescence, more obvious below. *Thorax.* Pronotum ochraceous with ferruginous markings; a broad ferruginous fascia on midline, spreading laterally at its posterior end against pronotal collar and to a slightly smaller degree at its anterior end, the shape of this fascia somewhat variable between individuals; broken ferruginous patches following

pronotal grooves and transversely between first and second grooves; also a narrow ferruginous border around ochraceous area, broadening laterally; pronotal collar ferruginous. Mesonotum dark ferruginous with much of dorsal region often tending brown with a dorsal pair of dark ferruginous obconical markings based on anterior margin, and sometimes a much larger lateral pair of similar obconical markings; cruciform elevation usually brown, sometimes dark ferruginous. Thorax below brown rather than dark ferruginous and usually bearing obvious silver pubescence. *Wings.* Hyaline, usually with a faint brownish tint. Fore wing basal cell tinted golden brown; venation brown with much of costal margin ferruginous; basal membrane orange basally becoming blackish, sometimes almost entirely black. Hind wing plaga muddy white to brown, very broad along 3A almost to its distal end and along inner margin, these two almost meeting, also very narrow plaga along 2A to or near to its distal end; venation brown. *Legs.* Brown, variable in tone both on individuals and between individuals. *Opercula.* Light yellowish brown; extending to or just beyond margins of tympanal cavities, never quite meeting; usually covered to a large degree by fine silver pubescence. *Abdomen.* Tergites ferruginous brown, usually dark. Sternites similar in colour to tergites but sternites III–VI usually with a narrow, orange-brown distal margin. Abdomen above and below often with silver pubescence. *Tymbals* (Fig. 19). Bearing 14 long ribs, otherwise as for generic description. *Genitalia* (Figs. 37, 38). Pygofer ferruginous; upper pygofer lobes in lateral and ventral views small and rounded; secondary upper pygofer lobes in lateral view sharply pointed and lying just below upper lobes, in ventral view conical with apex rounded; basal lobes in lateral view barely visible, in ventral view broad, angular with slightly rounded apex. Uncal lobes terminating in thick-set, down-turned lobes, in ventral view tapering to a blunt point. Conjunctival claws directed ventrally, very small, claw-like, simple.

Female (Fig. 40b). Colour and markings similar to male. Abdominal segment 9 ferruginous brown. Ovipositor sheath dark ferruginous, extending almost 1 mm beyond distal end of dorsal beak.

Measurements. n = 3♂♂, 1♀ (includes all available specimens). *Length of body:* male 19.9–21.5 (21.0); female 24.0. *Length of fore wing:* male 26.0–28.0 (27.1); female 29.8. *Width of head:* male 7.1–7.5 (7.3); female 8.2. *Width of pronotum:* male 7.0–7.6 (7.4); female 8.2.

Distribution. Mauritius and Reunion Islands. Records from Italian Somaliland (Melichar, 1904) and Bengal (Stål, 1866; Atkinson, 1885) are probably erroneous as they are based on single records from localities far removed from records of positive origin.

Abrieta ferruginosa (Stål, 1866)

Figs. 41a,b, 42, 43

Tibicen (*Abrieta*) *ferruginosus* Stål, 1866, 27.*Abrieta ferruginosa*.—Karsch, 1890: 121; Karsch, 1891: 348; Distant, 1906: 130; Orian, 1954: 235; Orian, 1956: 651; Mamet, 1957: 73; Metcalf, 1963: 208; Orian, 1964: 1–3; Dugdale, 1972: 858; Duffels & van der Laan, 1985: 234–235; Boulard, 1990: 209.**Type.** Location unknown.**Material examined.** MAURITIUS—1 ♂, G. Autelme, Pres. by Imp. Bur. Ent. Brit. Mus. 1926-403 (no other data apart from Mauritius); 1 ♂, Ile Maurice, Desjardins 2901-40, 338, Distant Coll. 1911-383 (BMNH). 1 ♂, Reduit, 2.x.[19]53, P. Le Merle, Coll. R. Mamet; 1 ♂, 87, Ray. Mamet; 1 ♂, 43, Ray. Mamet, Coll. R. Mamet; 1 ♀, Curepipe, [?]1903, Coll. R. Mamet; 1 ♂, Desjardins 2771–36 (all labelled Mauritius or Ile Maurice and det. Michel Boulard, 1978) (MNHP).**Description**

Male (Figs. 41a, 42, 43). *Head.* Black with a muddy yellow or brown spot on dorsal midline against posterior margin and sometimes this coloration expanded a little along posterior margin, also sometimes brown on outer margin of lorum. Postclypeus ferruginous brown to dominantly black, usually with black to varying degrees dorsally and as a broad band along ventral midline; a narrow muddy yellow margin laterally of variable length. Anteclypeus black, sometimes tending brown, especially at distal end. Rostrum black but usually with basal region partly brown; reaching to bases of hind coxae. Antennae brown to nearly black. Head usually with some silver pubescence, mainly confined to underside. *Thorax.* Pronotum ochraceous with black or nearly black markings to varying degree; nearly always with a broad, black fascia on midline spreading laterally at its posterior end against pronotal collar and to a smaller degree at its anterior end which falls just short of pronotal anterior margin; often this fascia internally brown along midline on anterior half; usually with a cluster of black mottling between first and second pronotal grooves and overlaying second groove; black also laterally; never black along anterior margin between eyes; pronotal collar ochraceous to dark ferruginous or a mixture of both, but usually becoming black laterally at or beyond lateral angles. Mesonotum dark ferruginous with a pair of indistinct middorsal obconical dark ferruginous markings based on anterior margin, defined only by a thin ill-defined pale margin; cruciform elevation also dark ferruginous. Ventrally brown rather than dark ferruginous and usually with obvious silver pubescence. *Wings.* Hyaline but usually with faint brownish tint. Fore wing basal cell tinted golden brown; venation brown with much of costal margin ferruginous; basal membrane brown to blackish. Hind wing plaga muddy white to brown, very broad along vein 3A almost to its distal end and along inner margin with intermediate area bearing dark brown suffusion, also very narrow plaga along vein 2A to its distal end; venation brown. *Legs.* Ferruginous brown; distal ends of femora usually indistinctly marked yellow, fore femora also usually indistinctly yellow along line of femoral spines. *Opercula.* Mid to dark brown; rounded, extending to or just beyond margins of tympanal cavities, meeting or very nearly meeting; usually covered to a large degree by fine silver pubescence. *Abdomen.* Tergites dark ferruginous but tergite 2 sometimes

indistinctly pale along its anterior margin. Sternites similar in colour to tergites but sternites III–VI usually with a narrow, orange-brown distal margin. Abdomen above and below often with silver pubescence. *Tymbals.* Bearing 11–12 long ribs, otherwise as for generic description. *Genitalia* (Figs. 42, 43). Pygofer ferruginous; upper pygofer lobes in lateral view small and rounded, in ventral view broad and rounded; secondary upper pygofer lobes in lateral view pointed and lying just below upper lobes, in ventral view terminating in a tooth-like projection; basal lobes in lateral view barely visible, in ventral view broad, tending angular with rounded apical region. Uncal lobes each terminating in thick-set, down-turned lobe with apex in ventral view bearing a short blunt projection on its outer margin. Conjunctival claws directed ventrally, very small, claw-like, simple.

Female (Fig. 41b). Colour and markings similar to male except that cruciform elevation is a little paler than remainder of mesothorax on the single available specimen. Abdominal segment 9 ferruginous tending partly brown laterally. Ovipositor sheath dark ferruginous, extending almost 1 mm beyond distal end of dorsal beak.

Measurements. n = 6 ♂♂, 1 ♀ (includes all available specimens). *Length of body:* male 28.5–31.4 (29.9); female 32.1. *Length of fore wing:* male 38.6–46.8 (43.0); female 45.9. *Width of head:* male 10.2–11.3 (10.9); female 11.1. *Width of pronotum:* male 11.0–12.9 (12.0); female 12.4.

Remarks. This species is markedly larger than *Abrieta brunnea*; in fact, within the *Abrieta* complex of genera it is the largest.

Orian (1964) studied the male genitalia of this species, especially the aedeagus. However, I had difficulty in relating some details of his figures to reality, particularly the attachment of the conjunctival claws to the distal end of the theca and the uncal lobes. His description of the cornu also differed from my dissection in relation to the spines that appeared to lie in the opposite direction. Three males of this species in BMNH have had their genitalia removed and these may well have been those examined by Orian. However, the genitalia preparations are apparently lost, it is not possible to assess Orian's interpretations fully.

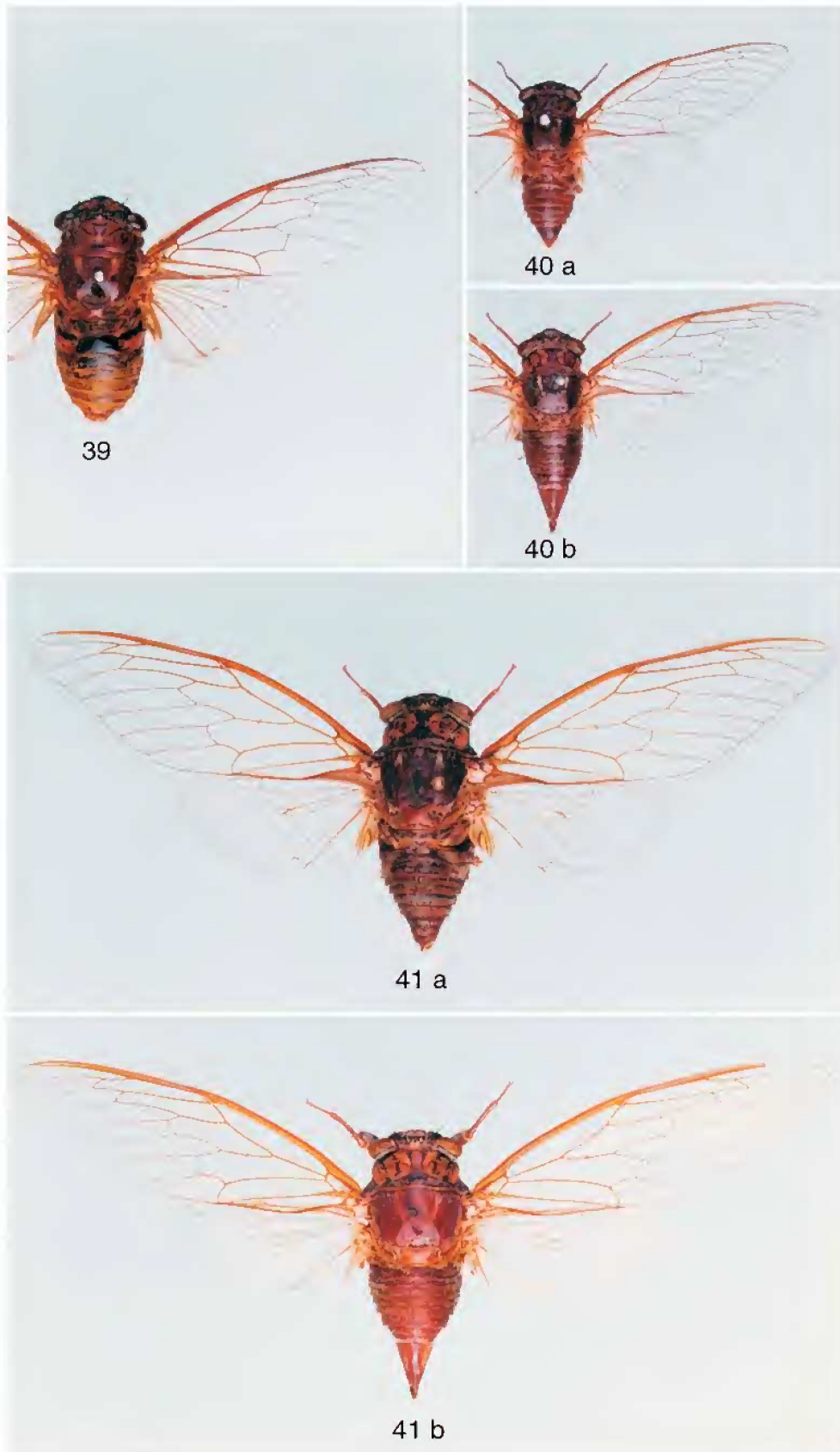
Distribution. Known only from Mauritius where, at times, it is common (Boulard, 1979).

Habitat. Adults inhabit upland rainforest (known locally as maccabe forest), preferring tree trunks below the canopy (O. Griffiths, pers. comm.).

Genus *Chrysolasia* n.gen.**Type species:** *Tibicen guatemalensis* Distant, 1883.**Included species:** *guatemalensis* (Distant).

Etymology. From the Greek *chrysos* meaning gold and *lasios* meaning hairy, woolly or shaggy and pertaining to the golden body hairs of the type species, *guatemalensis*.

Diagnosis. Postclypeus only slightly produced. Rostrum reaching to about bases of hind coxae. Width of head including eyes greater than anterior pronotum and nearly equal to mesonotum; width of male abdomen greater than width of thorax. Pronotal collar narrow with lateral angles



Figs. 39–41. *Trismarcha* and *Abricta* spp. (39) *Trismarcha umbrosa* Karsch, male. (40) *Abricta brunnea* (Fabricius); *a*, male; *b*, female. (41) *A. ferruginosa* (Stål); *a*, male; *b*, female. Approx. 1.3 × natural size.

ampliate and rounded; rudimentary and essentially confluent with adjoining sclerites anterior of lateral angles. Wings hyaline but with a very weak translucent brown tint. Fore wing without infuscations; costal margin moderately ampliate to node, the maximum dilation slightly less than width of costal vein, nodal line intersection near midpoint of ulnar cell; basal cell with translucent pigmentation. Hind wing plaga broad along much of vein 3A plus inner margin of anal lobe, narrower along vein 2A; light infuscation on wing margin at distal end of 2A, mostly on margin of anal lobe. Tymbals with 8 long ribs evenly spaced but slightly converging dorsally; basal plate small (Fig. 21). Male opercula linear, tending tear-drop in shape, weakly angled inwards before midpoint; nearly flat; just meeting and extending laterally and distally a little beyond tympanal cavities. Body bearing golden pubescence, possibly extensive on newly emerged individuals.

Male genitalia (Figs. 35, 36) with pygofer dorsal beak large, long and pointed; upper pygofer lobes moderately developed, pointed, undivided; pygofer basal lobes divided, outer lobe broad and rounded, inner secondary lobe pointed in lateral view. Uncal lobes broad, disc-like, tending towards meeting but never doing so, each terminating in a thick-set, down-turned blunt projection; uncal lateral processes absent. Aedeagus in lateral view gently curved for most of its length, basal plate a fused pair of nearly circular discs; conjunctival claws directed laterally and slightly ventrally, claw-like with no associated sclerotization, long and slender, strongly recurved, length about equal to diameter of theca, apex simple and pointed; flabellum and palearis absent.

Female. Unknown.

Distinguishing features. Within the *Abricta* complex of genera, golden abdominal pubescence is found only in this monotypic genus, the species of all other genera having silver pubescence. It is also the only genus in which the apex of the upper pygofer lobes are straight and pointed, in which the nodal line intersection lies near midpoint of ulnar cell and only 8 tymbal ridges. Although the broad, disc-like uncal lobes are found also in *Abricta*, *Abrroma* and *Monomatapa*, *Chrysolasia* differs in its more developed conjunctival claws which are directed laterally rather than ventrally, strongly recurved and are nearly equal in length to width of theca rather than much shorter. Other features of *Chrysolasia* are the broad male abdomen that is clearly wider than the thorax, and the linear and somewhat tear-drop shaped male opercula, both attributes shared only with *Monomatapa*. *Chrysolasia* differs from *Monomatapa* (in addition to the autapomorphies of *Chrysolasia* mentioned above) by having male upper pygofer lobes of moderate proportions compared to exceedingly small upper lobes in *Monomatapa*, well-developed secondary basal lobes which are absent in *Monomatapa*, and uncal lobes that are simply pointed whereas those of *Monomatapa* are double pointed (compare Figs. 35, 36 with 33, 34).

Distribution. Recorded from Guatemala but this locality requires confirmation (see discussion of distribution under *C. guatemalena*).

Chrysolasia guatemalena (Distant, 1883), n.comb.

Figs. 21, 35, 36, 51

Tibicen guatemalenus Distant, 1883: 18, pl. 2.

Tibicen guatemalanus [sic].—Distant, 1892b: 64.

Abricta guatemalena.—Distant, 1906: 131.

Type. Syntype ♂, bearing five labels: (a) "Purula./Vera Paz./Champion." machine printed; (b) "*Tibicen/guatemalenus/Dist*" in india ink probably in Distant's handwriting; (c) "B.C.A.Homopt.I./*Tibicen/guatemalenus./Dist*." machine printed; (d) "Type", machine printed on circular white label with red border; (e) "SYN-/TYPE" machine printed on circular white label with blue border (examined). (BMNH).

The original description by Distant (1883) suggests that there was probably only a single specimen available to him but this was not explicitly stated. While it is possible that he only had the one specimen listed above, following Recommendation 73F of the Code the specimen is retained as a syntype.

Type locality. Purula, Vera Paz, [? = Purulhá, Guatemala]. Distant (1883) described this species in a review of South American cicadas, recording it as coming from Guatemala. In fact he was so certain that it came from Guatemala he named it *guatemalenus*. However, the apparent absence of other related species within the Neotropics (and a lack of subsequent records) casts suspicion upon the accuracy of the type's label data and/or its interpretation. Purulia is a town in northern India and this locality would fit much better in the distribution patterns of the *Abricta* complex of genera. Nevertheless, a South American origin for this species cannot be dismissed and therefore Purula, Guatemala, is here accepted as the type's origin.

Material examined. Type male detailed above (the only known specimen).

Description

Male (Figs. 21, 35, 36, 51). **Head.** Nearly black with supra-antennal plates tending muddy yellow, a small muddy yellow spot on dorsal midline against posterior margin. Postclypeus muddy pale yellow. Anteclypeus black tending brown. Rostrum muddy yellow tending black towards apex, passing just beyond bases of hind coxae. Head with silver pubescence, mainly confined to lora. **Thorax.** Pronotum dark ferruginous; a broad black fascia on dorsal midline spreading laterally at its posterior end against pronotal collar, this fascia internally brown along midline; pronotal collar dark ferruginous. Mesonotum dark ferruginous brown with a large black mark anterior of cruciform elevation and a black fascia laterally against wing groove; cruciform elevation dark ferruginous. Thorax below muddy yellow with silver pubescence. **Wings.** Hyaline with a faint brownish tint. Fore wing basal cell distinctly brown; venation and costa brown; basal membrane orange brown. Hind wing plaga brown, broad along vein 3A to near its distal end and along inner margin, very narrow plaga along vein 2A to its distal end; venation brown. **Legs.** Light yellowish brown without obvious markings; bearing very fine silver pubescence. **Opercula.** Pale yellow-brown; somewhat tear-drop in shape, extending just beyond tympanal cavities to conceal tympana completely, laterally confluent with abdominal margin, very nearly meeting; bearing fine silver pubescence. **Abdomen.** Tergites black except for brown lateral region to tergite 2. Sternites brown

with posterior margins pale, sternites VII and VIII mostly pale. Abdomen above and below with golden pubescence. *Tymbals* (Fig. 21). As for generic description. *Genitalia* (Figs. 35, 36). Pygofer nearly black; upper pygofer lobe in lateral view small, broad at base and tapering to a blunt, off-centre point, in ventral view tilted inwards and tapering to a blunt point; basal lobes in lateral view small and tapering to a rounded apex and nearly equal in length to upper lobes, secondary basal lobes in lateral view small and sharply pointed. Uncal lobes terminating in a thick-set downturned lobe with apex bluntly pointed, in ventral vein gently incurved. Conjunctival claws claw-like, long, strongly recurved in dorsal view.

Female. Unknown.

Measurements. $n = 1\delta$ (the only available specimen). *Length of body:* 21.7. *Length of fore wing:* 27.3. *Width of head:* 7.7. *Width of pronotum:* 12.9.

Distribution. Known only from the male type, reputedly from Guatemala.

Genus *Aleeta* n.gen.

Type species. *Cicada curvicosta* Germar, 1834.

Included species. *curvicosta* (Germar).

Etymology. Derived from the Greek *aleton* meaning flour or meal and pertaining to the flour-like “dusting” partly covering the body of *A. curvicosta*, resulting from the fine silver body pubescence. This pubescence is easily abraded and is often substantially lacking on older adults.

Diagnosis. Postclypeus slightly produced. Rostrum reaching or just passing bases of hind coxae. Width of head including eyes equal to, or slightly wider than, anterior pronotum and equal to, or narrower than, mesonotum; width of abdomen as wide as thorax. Pronotal collar narrow with lateral angles ampliate and rounded; rudimentary and essentially confluent with adjoining sclerites anterior of lateral angles. Wings hyaline. Fore wing with infuscation at bases of apical cells 2 and 3; costal margin ampliate to node, the maximum dilation greater than width of costal vein; basal cell usually with translucent pigmentation. Hind wing with plaga along much of vein 3A plus inner margin of anal lobe and along length of vein 2A; plaga bordered by black infuscation that is partly expanded along wing margin at distal end of 2A. *Tymbals* (Fig. 20) with 11–13 long ribs (usually 12) evenly spaced but slightly converging dorsally; basal plate small. Male opercula tending tear-drop in shape, weakly angled inwards before midpoint; nearly flat; not quite meeting; extending laterally beyond lateral margins of abdomen and distally a little beyond tympanal cavities. Newly emerged individuals bear fine silver pubescence over much of body and along basal fore wing veins.

Male genitalia (Figs. 46, 47) with apical spine of pygofer large, long and pointed; upper pygofer lobes much shorter than apical spine, tending bilobed; pygofer basal lobes divided into primary outer and secondary inner lobes, the outer lobe in lateral view substantially webbed to inner lobe. Uncal lobes widely separated, beak-like, downturned; no lateral process at base of uncus. Aedeagus in lateral view straight or gently curved for most of its length, basal plate

a fused pair of nearly circular discs; conjunctival claws directed ventrally, claw-like with no associated sclerotization, flattened, broad in lateral view, narrow in ventral view, apex simple and pointed; a small sublateral rounded flange either side of theca near distal end; palearis absent.

Female abdominal segment 9 long, clearly more than half as long as abdominal remainder, nearly conical; ovipositor (Fig. 8) long with strong dorsal downward slope in lateral view; ovipositor sheath terminating about level with, or slightly extending beyond, apex of dorsal beak.

Distinguishing features. Male genitalia show features unique within the *Abricta* complex of genera: the beak-like uncal lobes and the partially bifurcate upper pygofer lobes do not occur elsewhere in the *Abricta* complex, while the pair of sublateral flanges near the distal end of the theca and the laterally flattened conjunctival claws are unknown in any other Cicadoidea. The broad male opercula, which extend clearly beyond the lateral margins of the abdomen, are also unique within the *Abricta* complex of genera. The strongly ampliate fore wing costa is shared with *Tryella* but is otherwise only found in a few distantly related genera.

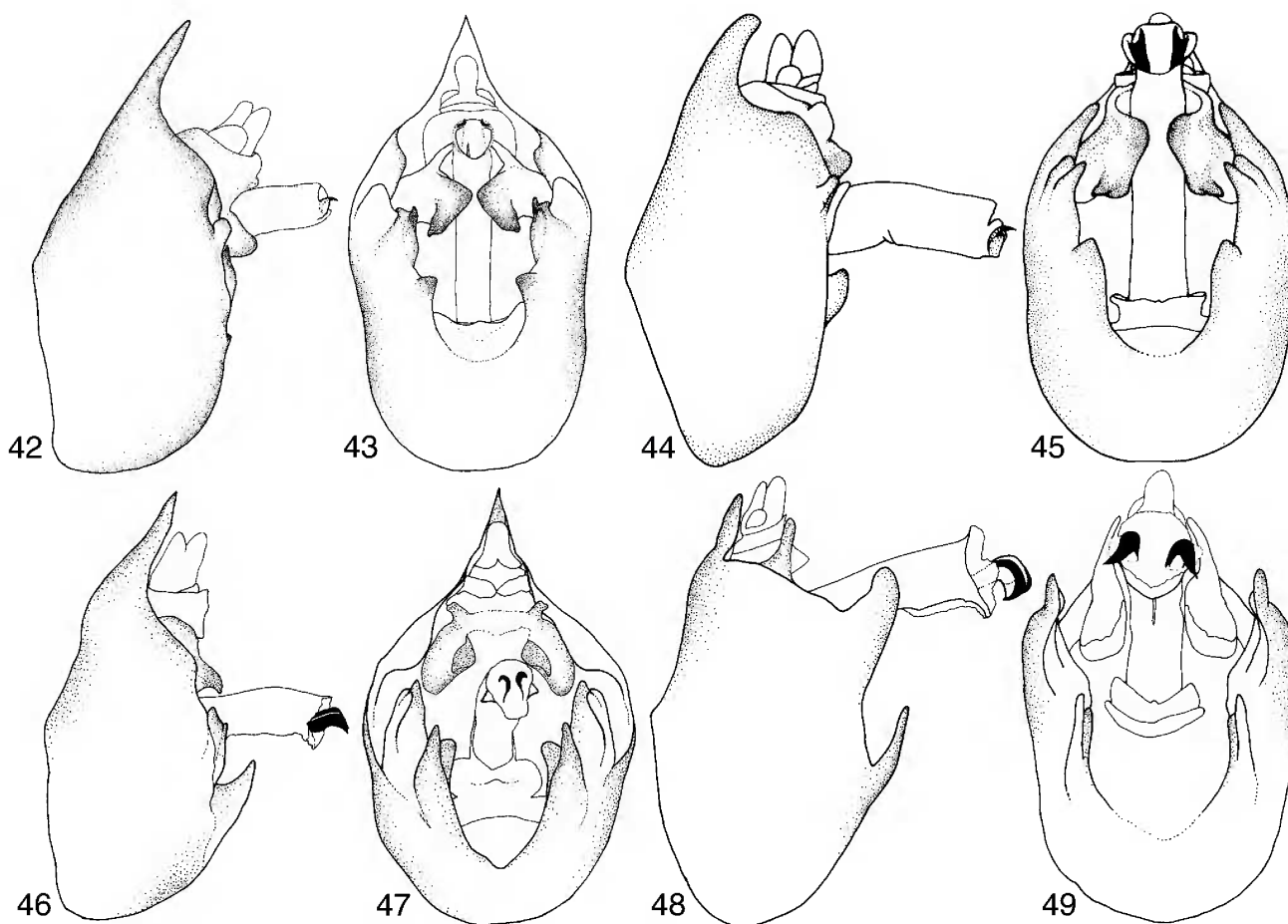
Remarks. The distinctive nature of this monotypic genus is also reflected in its genetic makeup. Allozyme electrophoresis revealed a high number of fixed differences between *A. curvicosta* and some allied species examined, reflecting the high genetic dissimilarity and long genetic distance between *A. curvicosta* and *Tryella* species (Serkowski & Moulds, unpub. data). Further, phylogenetic analyses of both electrophoretic and morphological data confirm the evolutionary distinctiveness of *A. curvicosta* from its sister group *Tryella* (Serkowski & Moulds, unpub. data, and Figs. 15–17). See also discussion under *Rationale for new taxa* (pp. 254–255).

Distribution. The single species included in this genus occurs in eastern Australia from northern Queensland to southern New South Wales.

Aleeta curvicosta (Germar, 1834), n.comb.

Figs. 8, 20, 46, 47, 50a–f, 60

Cicada curvicosta Germar, 1834: 66–67; Walker, 1850: 114; Dohrn, 1859: 73; Stål, 1859: 270; Bennett, 1860: 271; Ewart, 1990: 3. *Cicada tephrogaster* Boisduval, 1835: 610–611, pl. 10. *Tibicen curvicostus*.—Stål, 1861: 618. *Tibicen (Abricta) tephrogaster*.—Stål, 1866: 26. *Tibicina curvicosta*.—Froggatt, 1903: 418. *Tibicen curvicosta*.—Goding & Froggatt, 1904: 565, 599–600. *Abricta curvicosta*.—Distant, 1906: 130; Froggatt, 1907: 351; Kirkaldy, 1907b: 308; Ashton, 1914: 349; Froggatt, 1914: 341; Distant, 1920: 457; Singh-Pruthi, 1925: 194, pl. 20; Chisholm, 1932: 131; Kato, 1932: 181, pl. 28; Froggatt, 1933: 93; Finlayson, 1934: 232; McKeown, 1942: 98; McKeown, 1944: 234, 237; Anonymous, 1948: 1; Musgrave, 1953: 15; Tillyard, 1926: 161; Kato, 1956: 61, pl. 14; Burns, 1957: 635, 636; McKeown, 1958: 380; Metcalf, 1963: 206–207; Orian, 1964: 1; Wilson, 1970: 22; Woodward *et al.*, 1970: 413; Young, 1972a: 343, 352–355; Young, 1972b: 238, 241, 242, pls. 1, 3; Young, 1973: 377, 378; Michelsen & Nocke, 1974: 257; McAlpine, 1977: 25; Noyce, 1980: 9; Hockings, 1980:99; Moulds, 1983: 434; Young & Josephson, 1983a: 185, 186, 192, 194; Young & Josephson, 1983b: 198, 204, 206; Duffels & van der Laan, 1985: 234; Mac Nally & Doolan, 1986a: 281, 284–291; Mac



Figs. 42–49. Male genitalia of *Abricta*, *Abroma*, *Aleeta* and *Tryella* species showing pygofer with uncus and aedeagus in right lateral view (left) and ventral view (right): (42–43) *Abricta ferruginosa*, Mauritius; (44–45) *Abroma guerinii*, Madagascar; (46–47) *Aleeta curvicosta*, genitalia prep. AB32; and (48–49) *Tryella noctua*, genitalia prep. AB21.

Nally & Doolan, 1986b: 35, 37–40, 42–43, 46; Clyne, 1990: 133; Moulds, 1990: 119–120, pl. 15; Moulds & Carver, 1991: 467; Boulard, 1991: 118; Ewart, 1995: 82; Moss, 1997: 10; Ewart, 2001a: 502–505, 507, 508; Ewart, 2001b: 69–75, 81–83.

Types

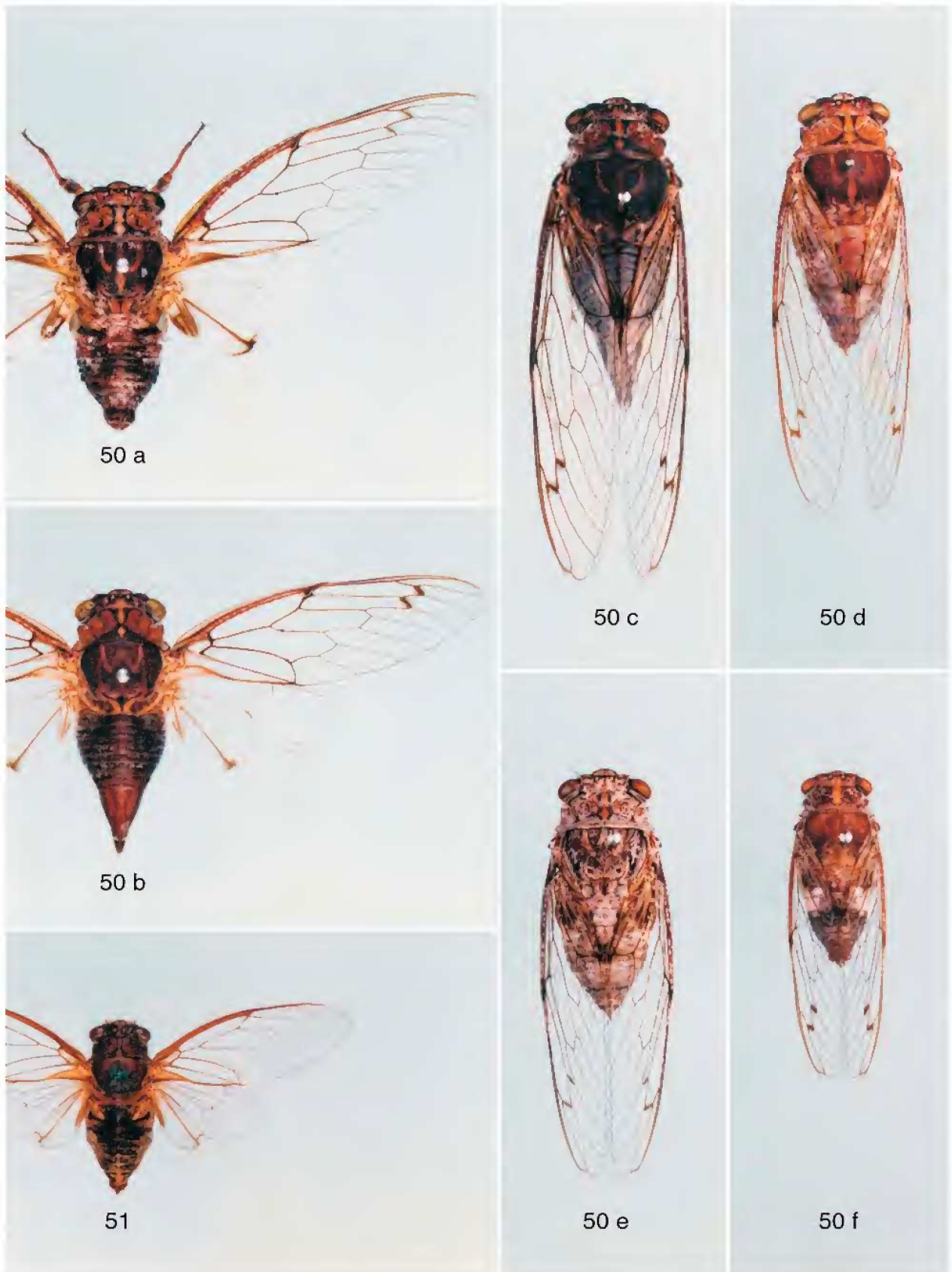
(a) *Cicada curvicosta* Germar. Lectotype ♂ here designated and paralectotype ♂ (in OUM). Lectotype ♂ bearing three labels: (a) “Hem. Type No. 790 1/2”; (b) “NH” [= New Holland] white label handwritten in ink; (c) “*curvicosta* Germ” blue label handwritten in pencil. Paralectotype ♂ bearing two labels (a) “Hem. Type No. 790 2/2”; (b) “NH” white label handwritten in ink.

Lectotype designation. Germar did not designate a type for *curvicosta* or list the specimens he examined. Ewart (1990) confirmed the existence of two specimens (both male) in the Hope Entomological Collections, Oxford, that could be regarded as syntypes. To ensure the identity of this species as previously known and to maintain the long established synonymy of *curvicosta* and *tephrogaster* the specimen (Hem. Type No. 790 1/2) is here designated lectotype. The remaining specimen (Hem. Type No. 790 2/2) is designated paralectotype.

Type locality. The type locality is known no better than Australia. Germar’s types are labelled only as coming from New Holland while his description of the species simply gives the locality as “Habitat in Australasia”.

(b) *Cicada tephrogaster* Boisduval. Lectotype ♂ here designated and paralectotype ♂ (in MNHP) (examined). Lectotype ♂ bearing three labels: (a) “Portjacks./Durville” handwritten in india ink; (b) “*Cicada tephrogaster* Bdv” in handwriting of Boisduval; (c) “Voyage de l’Austrolabe/Holotype ♂/*Cicada tephrogaster*/Boisduval/Michel Boulard det. 1990” partly handwritten, partly machine printed. Paralectotype ♂ bearing three labels: (a) “*tephrogaster*/Port Jackson/M. d’Urville” handwritten in india ink; (b) “*Cicada tephrogaster* Boisd.” in handwriting of Boisduval; (c) “Voyage de l’Austrolabe/Paratype ♂/*Cicada tephrogaster*/Boisduval/Michel Boulard det 1990” partly handwritten, partly machine printed.

Lectotype designation. Boisduval did not designate a type for *tephrogaster* or state the number of specimens he examined. Boulard (1991) confirmed the existence of two specimens (both male) in MNHP that should be regarded as syntypes. To ensure the synonymy of *tephrogaster* with *curvicosta* the specimen labelled holotype is here chosen as lectotype and the remaining specimen as paralectotype.



Figs. 50–51. *Aleeta* and *Chrysolasia* spp. (50) *A. curvicosta* (Germar); *a,d,e,f*, males; *b,c*, females; (51) *C. guatemalena* (Distant), male. Approx. 1.4 × natural size.

Material examined. Types and the following: QUEENSLAND—1♂, Cairns, 6–20.i.1962, Carne & Britton; 4♂♂, 5♀♀, Bundaberg, 18.ix.1972, on trunk of Casuarina, H. Frauca; 1♀, Bin Bin via Dicot, 14.ix.1975, H. Frauca; 1♂, Brisbane, 2.i.[19]11, W.W. Froggatt Collection; all in ANIC. 1♂, Ravenshoe, 11.i.1962, E.B. Britton; 1♀, Peak Downs (no date or collector); all in BMNH. 1♀, Mt Molloy, 20.xii.1987, T.A. Moulds; 2♂♂, 6♀♀, Rifle Creek, Mt Molloy, 9.i.1992, L.R. Ring; 3♂♂, 4♀♀, Julatten, 1.iii.1979, 30.i.1980, 15.ii.1981, 4.i.1983, 19.xii.1985, 15.xii.1987, A. Walford-Huggins; 1♂, 1♀, Julatten, 27.i.1986, H. & J. Beste; 6♂♂, 10♀♀, Julatten, 1.i.1977, 24.i.1981, 29.i.1982, 4.i.1984, 16.i.1988, MBM; 1♂, 1♀ (male genitalic preparation no. AB34), Julatten, 4.i.1980, A. Hiller; 2♀♀, Black Mtn Rd, 23 km from Kuranda, 27.i.1977, AMW-H; 1♂, 20 km N of Kuranda, 4.i.1978, A. Hiller; 1♀, Black Mtn Rd, Kuranda, 28.i.1979, R. Storey, I. Titmarsh; 52♂♂, 35♀♀, Kuranda, 25.xi.1987, 3.i.1988, 4.i.1988, 7.i.1988, and 10.i.1988, J. Hasenpusch; 9♂♂, 1♀ (1 male genitalic preparation no. AB38), Kuranda, 16.i.1960, M.S. Moulds; 10♂♂, 15♀♀, Kuranda, 29.xii.1976, 5.i.1977, 14.i.1977, 16.i.1977, 15.i.1988, MBM; 1♂, Kuranda, 31 xii.1988, H. & A. Howden; 1♂, Kuranda, 5–15.i.1976, J. McLoughlin; 1♀, Kuranda, 1–10.i.1987, C. Rojewski; 1♂, Kuranda, 4 i.1974, AMW-H; 4♂♂, 2♀♀, Kuranda, 29.i.1980, 30.xii.1982, 13,22,23.i.1983, G. Wood; 1♀, Myola, 10.i.1976, J. McLoughlin; 2♂♂, Myola, 6.i.1974, AMW-H; 1♀, Oak Forest, 8.iii.1973, A.P. & M. Walford-Huggins; 1♂, 1♀, Clohesy River S.F. SW of Kuranda, 18.i.1984, MBM; 1♂, Mareeba Road, Clohesy R., 17.i.1974, AMW-H; 5♂♂, 1♀, Atherton, 18.i.1980, A. Irvine; 2♂♂, 2♀♀, Atherton, 14,27.xi.1989, D.A. Lane; 2♂♂, 2 km W of Atherton, 7.i.1990, D.A. Lane; 2♂♂, (1 genitalic preparation no. AB41), Wondecla, nr Herberton, 4–8.i.1981, G. Wood; 1♀, 16 km W of Ravenshoe, 2.i.1975, M.S. Moulds; 1♀, Cairns, i.1960, M.S. Moulds; 1♂, Mulgrave R, 25 km S of Gordonvale, 30 m, 15.i.1980, A. Hiller; 1♀, Tully Gorge, 21.i.1990, J. Hasenpusch; 3♂♂, nr Garradunga, nr Innisfail, 6.xi.5,31.xii.1987, J. Hasenpusch; 1♀, Storey Ck, Garradunga, 8.xii.1992, J. Hasenpusch; 1♂, 11♀♀, Kirrama Range, W of Kennedy, 17.i.1990, MBM; 2♂♂, Brandon, nr Ayr, 26.xii.1989, MBM; 1♂, 1♀, Ayr, 8.i.1967, M.S. Moulds; 10♂♂, 3♀♀ (1 male genitalic preparation no. AB30), Funnel Creek, 50 km SW of Sarina, 8.xii.1980, MBM; 8♂♂, 5♀♀, Waverley Ck, Bruce Hwy, 10 km S of St Lawrence turnoff, 21.xii.1987, 23.i.1992, MBM; 9♂♂, 8♀♀, Cathu State Forest, N of Eungella Nat. Pk, 600 m, 21.i.1990, 22.i.1992, MBM; 2♂♂, 3♀♀, same data but base of range 150 m; 1♂ (genitalic preparation no. AB33), Eungella Nat. Park, W of Mackay, 10.i.1967, M.S. Moulds; 2♂♂, 1♀ (1 male genitalic preparation no. AB42), Gargett, W of Mackay, 14.i.1979, L.R. Ring; 1♂, 48 km S of Glenden Mine, 17.i.1987, MBM; 1♂, 1♀, Mackay, i.1985 and i–ii.1985, E.W.J. Adams; 1♀, Seaforth via Mackay, 1.i.1988, B. van Moolanbroek; 1♂, Rockhampton, 20.xii.1976, MBM; 1♂, Kawana, Rockhampton, 20.i.1984, R. Eastwood; 1♀, Yeppoon, 16.i.1992, A. Walford-Huggins; 2♂♂, Isaac R. x-ing N of Dingo/Mt Flora road, 27.i.1986, MBM; 5♂♂, 7♀♀, McKenzie River x-ing 75 km NNE of Dingo, 17.i.1987, MBM; 5♂♂, 3♀♀, 2 km W of Emerald, 1.i.1994, J.E. & M.S. Heath; 3♂♂, 1♀, Dawson R., 4 km SW of Mourangee Hsd, nr Edungalba, i.1985, E.E. Adams; 2♂♂, Dawson River, 7 km SW of Mourangee Hsd, nr Edungalba, 12.xii.1987, E.E. Adams; 1♂, 6 km SW of Mourangee Hsd, nr Edungalba, 20.xii.1987, T.A. Moulds; 1♂, 50 km S of Duingara, 29.i.1986, MBM; 3♂♂, Christmas Creek, 43 km S of Rolleston, 20.xii.1983, MBM; 14♂♂, 8♀♀ (1 male genitalic preparation no. AB67), 85 km S of Rolleston, 20.xii.1983, MBM; 1♂, 60 km N of Biloela, 22.i.1982, MBM; 11♂♂, 15♀♀, (1 male genitalic preparation no. AB66), Theodore, 23,24.xii.1989, R. Eastwood; 3♂♂, 11 km SSE of Wandoan, 22.xii.1989, MBM; 4♀♀, base, Mount Scoria, 6 km S of Thangool, 24°32'S 150°36'E, 10.ii.1991, GAD, C. Burwell; 5♂♂, 1♀, (1 male genitalic preparation no. AB36), Upper Granite Ck, S of Miriam Vale, 7.xii.1980, MBM; 1♂, 30 km NE of Lowmead, 31.xii.1974, G.B. Monteith; 1♀, Bundaberg, 5.x.1982, J. North; 1♀, Bundaberg, 10.xi.1985, F.G. Sattler; 1♀, Wallaville, 20.xii.1972, G. Cook; 1♀, Mt Goonaneman, via Childers, 6–7.ii.1981, G.B. Monteith; 1♀, Burnett River, 10 km N of Eidsvold, 20.i.1988, MBM; 1♂, Torbanlea nr Pialba, 20.i.1979, J.V. Peters; 1♂, Maryborough, 1.xi.1988, K.L. Dunn; 1♀, Maryborough, 23.xi.1986, R. Eastwood; 1♀, Gympie, 30.xi.1988, R. Eastwood; 1♂, Doonan, Noosa Valley, 31.i.1988, R. Eastwood; 5♀♀, Ningi, 27.xii.6.i.1992, G.R. Cleminson; 1♂, 2♀♀, 14 km N of Nambour, 24.i.1992, MBM; 2♂♂, Mudjimba Beach, Sunshine Coast, 5.i.1988, R. Eastwood; 1♂, Maroochydore, 1.xii.1985, K. Tyrer; 4♂♂, 8♀♀, Maroochydore, 5.xii.1978, 7,8,10.xii.1985, 1.ii.1987, 23.xi.1987, 30.xii.1987, 5,9.i.1988, 10.xii.1990, 16.ii.1991, R. Eastwood; 1♂, The Cod Hole, Maroochydore, 6.xi.1985, R. Eastwood;

1♂, 1♀, Buderim, 1.i.1978 and 10.xi.1980, R. Eastwood; 1♂, Maleny, 30.xii.1977, R. Eastwood; 1♀, 30 mi N of Brisbane, 12 i.1973, P. Zborowski; 1♂, Somerset Dam, 19.i.1992, R. Eastwood; 1♀, Mt Nebo, 500 m, NW of Brisbane, 7.i.1986, A. Hiller; 1♂ (genitalic preparation no. AB40), Brisbane, 16.i.1973, M.S. Moulds; 1♂, Brisbane, 30.xi.1978, J. North; 1♀, Brisbane, 9.ii.1975, A. Walford-Huggins; 1♂, 1♀, Redcliffe, Brisbane, 9.xii.1983, R. Eastwood; 2♂♂, 1♀, Redland Bay, [Brisbane], 12,16.i.1992, R. Eastwood; 1♂, Stafford, 26.ix.1985, S.R. Raine; 2♀♀, Jamboree Heights, Brisbane, 15.xii.1984, 22.xii.1990, G. Daniels; 1♀, Jamboree Heights, Brisbane, 13.xii.1979, A. Daniels; 1♂, Rainworth, Brisbane, 8.xii.1979, J. Conran; 1♂, Taringa, Brisbane, 6 x.1984, J.T. North; 5♂♂, St Lucia, Brisbane, x.1983, 6.x.1984, 22.xii.1985 and 3.i.1986, R. de Keyzer; 1♂ (genitalic preparation no. AB32), St Lucia, Brisbane, 17.xii.1976, MBM; 1♂, 2♀♀, St Lucia, Brisbane, 27.i.1980, 24.ii.1980 and 13.xi.1980, C. Hagan; 2♂♂, St Lucia, Brisbane, 3.xii.1985, 5.ii.1990, G. Daniels; 1♂, Corinda, Brisbane, 7.i.1982, J. North; 1♀, Tarragindi, Brisbane, 20.vii.1984, J.T. North; 3♀♀, Doolandella, Brisbane, 11,12.i.1985, MBM; 1♂, Moogerah Dam, Aratula, 11.i.1993, R. Eastwood; 3♀♀, Isle of Capri, Gold Coast, 6.xii.1989, 9.xii.1989 and 13.i.1990, R. Eastwood; all in MSM. 1♂, Daintree R., [no date], K. Hateley; 1♂, Mt Molloy, 3.i.1954, G.B.[rooks]; 6♂♂, 1♀, Kuranda, 14.i.1950, 28,29.i.1951, G.B.[rooks]; 1♀, Cairns, [no date], Edmund Jarvis; 1♂, 1♀, Cairns Dist., 1945, S. Brock; 1♂, Mulgrave River, 26.xii.1926, A.N. Burns; 1♀, Mackay, 15.iii.30, A.N. Burns, Collection A.N. Burns [labelled allotype *A. cadulua*, an unpublished manuscript name]; 1♂, Westwood, 4.i.24, A.N. Burns, Collection A.N. Burns [labelled holotype of *A. cadulua*, an unpublished manuscript name]; 1♀, Noosa Heads, i.1962, [J.] Guyomar; 11♂♂, 4♀♀, Brisbane, 14.xii.1952, 12 & 21.ii, 27.xi, 10.xii.1954, 27.xii.1958, 27.xii.1959, 7.i.1961, J. Kerr; 2♂♂, Mt Cootha, 12.iii.1955, J. Kerr; 2♂♂, Burleigh Heads, 3–4.i.1956, 26.i.1958, J. Kerr; 1♂, Esk, 14.xii.1958, J.K[err]; all in MV. 1♀, Bundaberg, Baldwin's Swamp Survey 1992, Eric Zillman; 1♂, Brisbane, 14.i.[19]13, H. Hacker; 1♀, Brisbane, 2.xii.[19]52, R.H. Magee; 1♀, Mus[eam] Brisbane, 31.i.[19]52, D.P. Vernon; 1♂, Wilston, Brisbane, 5.i.[19]61, B. Poysler; 1♂, Inglewood (no other data); 3♂♂, 1♀, "Glen Witheren", Canungra Creek, 20–22.i.1987, G.B. Monteith; 1♀, Cunningham's Gap, New Year 1962 (no other data); all in QM. 1♀, Gordonvale, 13.i.[19]49, B. Hitchcock; 1♀, Tully, iii.1961, A. Flegler; 1♀, Townsville, 15.viii.[19]57, I. Sutherland; 1♂, Greta Ck, 20 mi N of Proserpine, 1.i.1965, G. Monteith; 1♀, Springsure, 7.xi.1950, D.G. Tulloch; 1♀, Colosseum Ck, 10 mi S of Miriam Vale, 20.xii.1966, B. Cantrell; 1♂, Biloela, 21.i.[19]47, F. Kleinschmidt; 1♀, 20 mi S of Biloela, 7.i.1972, B. Cantrell; 1♂, 2♀♀, 30 km NE of Lowmead, 31.xii.1974, G.B. Monteith; 1♂, Planted Ck, via Tansey, 12.xii.1976, G.B. & S.R. Monteith; 1♀, Gympie, 9.ii.[19]45, M. Sauer; 1♂, Gympie, 20.xi.1965, B.A. Mooney; 1♂, M'yadore [= Maroochydore], 25.xii.[19]21, J.A. Beck; 1♂, Lawes, xii.[19]54, J. Thapa; 1♂, Gatton, 14.xii.[19]34; 1♀, Brisbane, 11.viii.[19]57, G. Diatloff; 1♂, Brisbane, 4.i.[19]43 (no other data); 1♂, Brisbane, 1.xi.[19]57, P. Ranby; 1♀, Tingalpa, [Brisbane], 21.i.[19]56, G.E.; 2♂♂, Brisbane, 28.i.,14.ii.1951, C. Deane; 1♂, Brisbane, 16.i.[19]50, R. Domrow; 1♀, St Lucia, [Brisbane], ii.1959, I. Rowlingson; 1♀, Brisbane, i.1961, R.G. Winks; 1♂, Redland Bay, [Brisbane], 19.xi.[19]62, G. Shaw; 1♂, Warwick, 1.i.[19]55, R.W. Downes; all in UQIC. NEW SOUTH WALES—1♀, Dorrigo [no other data], Collaroy [Sydney], 2.i.1959, K.R. Norris; 1♀, Gerringong, i.1926, M. Fuller; all in ANIC. 1♂, Parramatta (no date or collector) BMNH. 1♂, Nabiac, 2.xii.1966, L.R. Greenup; 1♂, Terrigal, 1.i.1970, L.R.G.[reenup]; 1♂, East Gosford, 28–29.xi.1964, P.C. Hely; 1♀, Wiseman's Ferry, ii.1964, R. Craig; 1♂, Earlwood, Sydney, 29.i.1959, L.G.[reenup]; 1♂, Cabramatta, [Sydney], 20.i.1963, M. Nikitin; all in LG. 1♂, Chinderah, Tweed River, 9.i.1985, MBM; 2♂♂, 1♀, Mt Warning, 300 m, 20.i.1988, R. Eastwood; 1♂, Kilgra, approx. 10 km N of Kyogle, 11.i.1976, W. Rixon; 1♂, Upper Eden Creek, nr Kyogle, 12.i.1967, M.S. Moulds; 1♂, Upper Eden Creek, nr Kyogle, 8.i.1985, MBM; 1♂, Kyogle, 10.i.1975, M.S. Moulds; 1♂, Lismore, 3 xii.1986, S. & B. Underwood; 1♀, Tregagle, 10 km SW of Lismore, 20.i.1980, D. Yeates; 2♂♂, Konorogan [= Konorigan], 17.i.1965, G.R. Brown; 1♀, Wyrallah, 1.i.1967, G.R. Brown; 1♂, Pimlico, 12.i.1993, B. Thomas; 1♂, Black Swamp Tenterfield, 19.xii.1980, F.G. Sattler; 1♂, Coffs Harbour, 2.i.1971, M.S. Moulds; 2♂♂, Coffs Harbour, 10,20.i.1972, S. Devine; 1♂, 1♀, Coffs Harbour, 14,17.xii.1987, B.C. White; 1♂, Sawtell, 15.xii.1987, B.C. White; 1♀, Bellingen, xii.1987, K. Slater; 1♂, Urunga, 24.i.1971, M.S. Moulds; 2♀♀, Port Macquarie, 10.i.1972, M.S. Moulds; 20♂♂, 9♀♀ (1 male genitalic preparation no. AB39), Lansdowne, nr Taree, 27.xi.1980, MBM; 1♀, Lansdowne, 26.xi.1980, G. & T. Williams; 2♂♂, 2♀♀, 3 km N of Lansdowne, nr Taree, 7–

13.xii.1987, 30.xi–6.xii.1987 and 21–27.xii.1987, G. Williams; 1♂ (genitalic preparation no. AB35), Old Bar nr Taree, 8.i.1972, M.S. Moulds; 1♀, Dudley, Newcastle, 18.ii.1988, A. Atkins; 11♂♂, 8♀♀, Cardiff, Newcastle, 26.xi.1991, 1,2,6,20,30.xii.1991, 11,18,20,21,27.i.1991, F.G. Sattler; 1♂, 1♀, Charmhaven, 25.xi.1989, MBM; 1♂, Charmhaven, 23.xi.1990, A. Holmes; 1♀, Wheeny Ck, N of Kurmond, 22.ii.1992, MBM; 1♂, Ourimbah S.F., 19.i.1988, B.C. White; 1♂, Avoca Beach, nr Gosford, 23.xi.1985, S. Hunter & A. Johnson; 1♂, 2♀♀, Avoca Beach, i.1979, 3.xii.1983, S. Hunter; 2♂♂, 1♀, Saratoga, nr Gosford, 9.xii.1985, Darley-Bently; 1♂, Barrenjoey, 10.i.1970, J.V. Peters; 1♀, Bayview, nr Church Point, 21.xii.1981, L.C. Haines; 2♂♂ (1 male genitalic preparation, no. AB37), 2♀♀, Avalon Beach, Sydney, 20.xii.1968, 18.i.1962, 13.i.1963, 27.xii.1969, 28.xii.1969, 29.xii.1969, 1.i.1970, 2.i.1970 and 26.xii.1973, M.S. Moulds; 1♂, 1♀, Narrabeen, Sydney, 30.xii.1971, M.S. Moulds; 1♂, 4♀♀, Narrabeen, 30.i.1985, 12.xii.1985, i.1986 and ii.1990, G. Hangay; 5♂♂, Long Reef, 5.i.1972, J.V. Peters; 1♀, Forestville, Sydney, 18.xii.1987, T.I. Wallace; 1♀, Lane Cove, Sydney, 11.i.1988, S. & B. Underwood; 1♂, Lane Cove, 12.ii.1972, [no collector]; 1♂, Narremburn, Sydney, 3.xii.1979, C. Holmes; 2♂♂, 3♀♀, Greenwich, Sydney, 1.ii.1969, 20.xii.1969, 20.i.1970, 2.ii.1970 and 27.xii.1973, M.S. Moulds; 1♂, Greenwich, Sydney, 16.xii.1975, MBM; 2♂♂, 1♀, Greenwich, Sydney, 19.xii.1975 and 3.ii.1983, T.E. Moulds; 2♂♂, Greenwich, Sydney, 19.i.1974, C. Holmes; 3♂♂, 3♀♀ (1 male genitalic preparation no. AB31), Gymea, Sydney, 2.ii.1979, R. Eastwood; 1♂, Rose Bay, Sydney, xii.1985, D. Sheehy; 1♀, Eastern Suburbs, Sydney, i.1988, M. Sharon; 3♂♂, 3♀♀, Bexley, Sydney, 18.ii.1978 and iii.1983, B. Brunet; 1♂, Royal National Park nr Sydney, 4.xii.1965, B. Brunet; 2♂♂, Boudi National Park, 11.i.1969, G.R. Brown; all in **MSM**. 6♂♂, 4♀♀, Coffs Harbour, 24,29.xii.1949, F.D.; 1♂, Bandon Grove, 21.xii.1958, on blackthorn bush, W.McK. Dowling; 1♂, Mona Vale, 27.xii.1957, M.I.N.[ikiten]; 1♀, Narrabeen, 7.i.1932, A.B.; 5♂♂, 2♀♀, Redhead, 27.xii.1925, 20–31.xii.1952, 27.xii.1955, R.D[obson]; 1♀, labelled only “presd by Dr Goding & Froggatt, NSW, xi.04”, [also incorrectly labelled *Tibicen rubra* and as paratype *Abricta cadulua*, the latter an unpublished manuscript name]; all in **MV**. 1♀, Sydney, ii.1922, G.H. Hardy, **QM**. 1♀, Sydney [determined as *Tibicen rubra* G. & F. by Goding & Froggatt 13.10.04; also labelled as paratype of *Abricta kadulua* A.N. Burns but the name was never published], **SAM**.

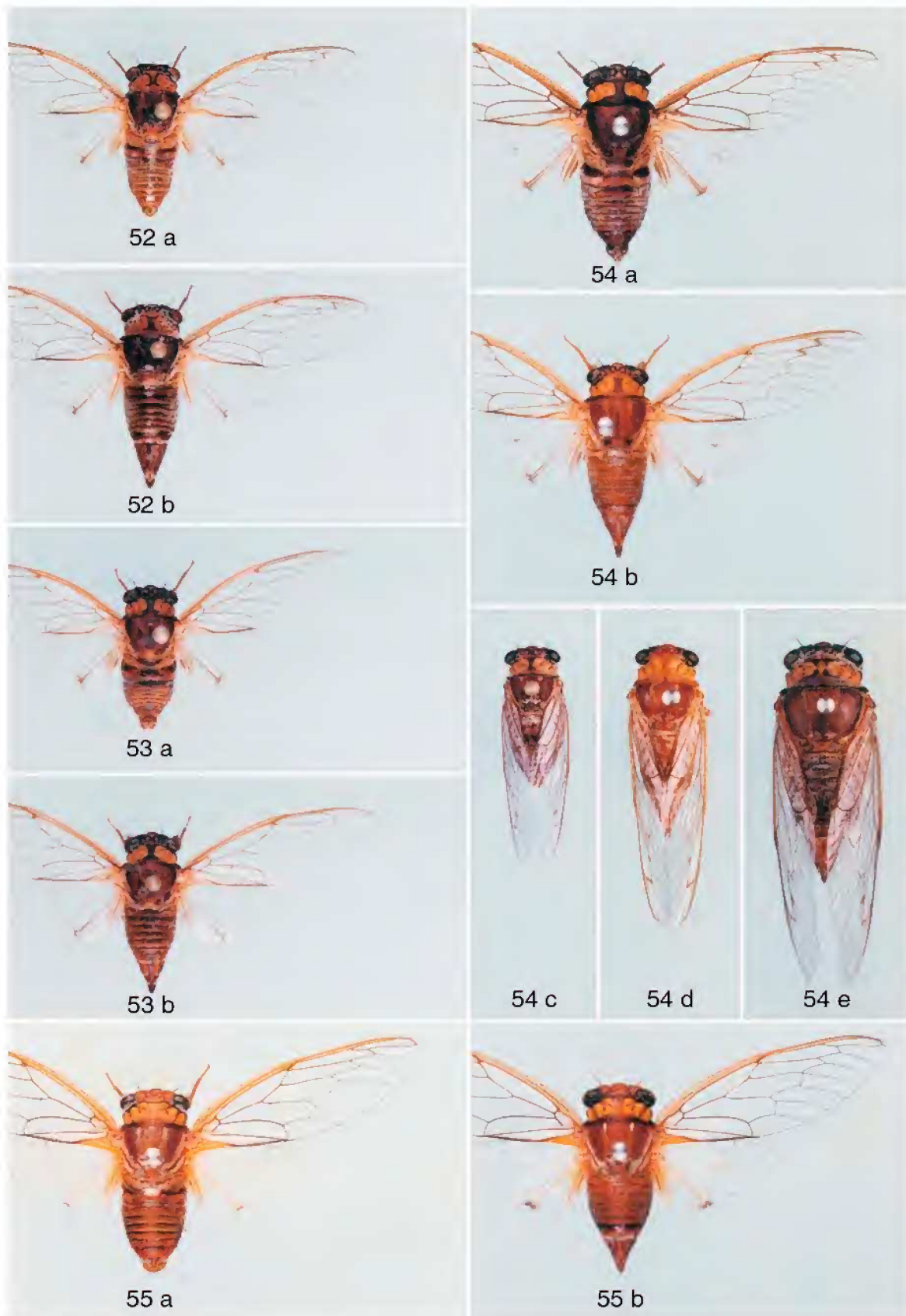
Description

Male (Figs. 20, 46, 47, 50a,d,e,f). *Head*. Brown with dominant areas of black surrounding ocelli and on supra-antennal plate; usually with a muddy yellow or light brown spot on dorsal midline against posterior margin, this spot appearing as an extension of marking of similar colour along midline of pronotum. Postclypeus usually brown but often with some black, sometimes substantially black; lateral margins usually edged muddy yellow or light brown. Anteclypeus usually brown but sometimes tending black; with a small thickened anterior lip always glossy black in vicinity of midline. Rostrum brown but usually partially or entirely black in apical region, sometimes for its full length laterally; reaching to, or a little beyond, bases of hind coxae. Antennae brown to nearly black. Head usually covered to some extent with silver pubescence, especially so on underside. *Thorax*. Pronotum brown, usually of similar tone to that of head and usually paler than mesonotum (concolorous in specimens from low rainfall inland areas); midline with a broad muddy-yellow to light brown fascia terminating at or near pronotal collar, this fascia edged black, the black expanded partly along anterior margin and at its posterior end adjacent to pronotal collar; pronotal collar usually light brown, sometimes muddy-yellow, occasionally dark brown laterally anterior of lateral angle; much of pronotum usually covered to some extent with silver pubescence, sometimes extensively so except for majority of pale dorsal midline. Mesonotum usually dark ferruginous, sometimes partly black; midline usually marked by an indistinct narrow light brown fascia and a pair of similar paramedian bowed

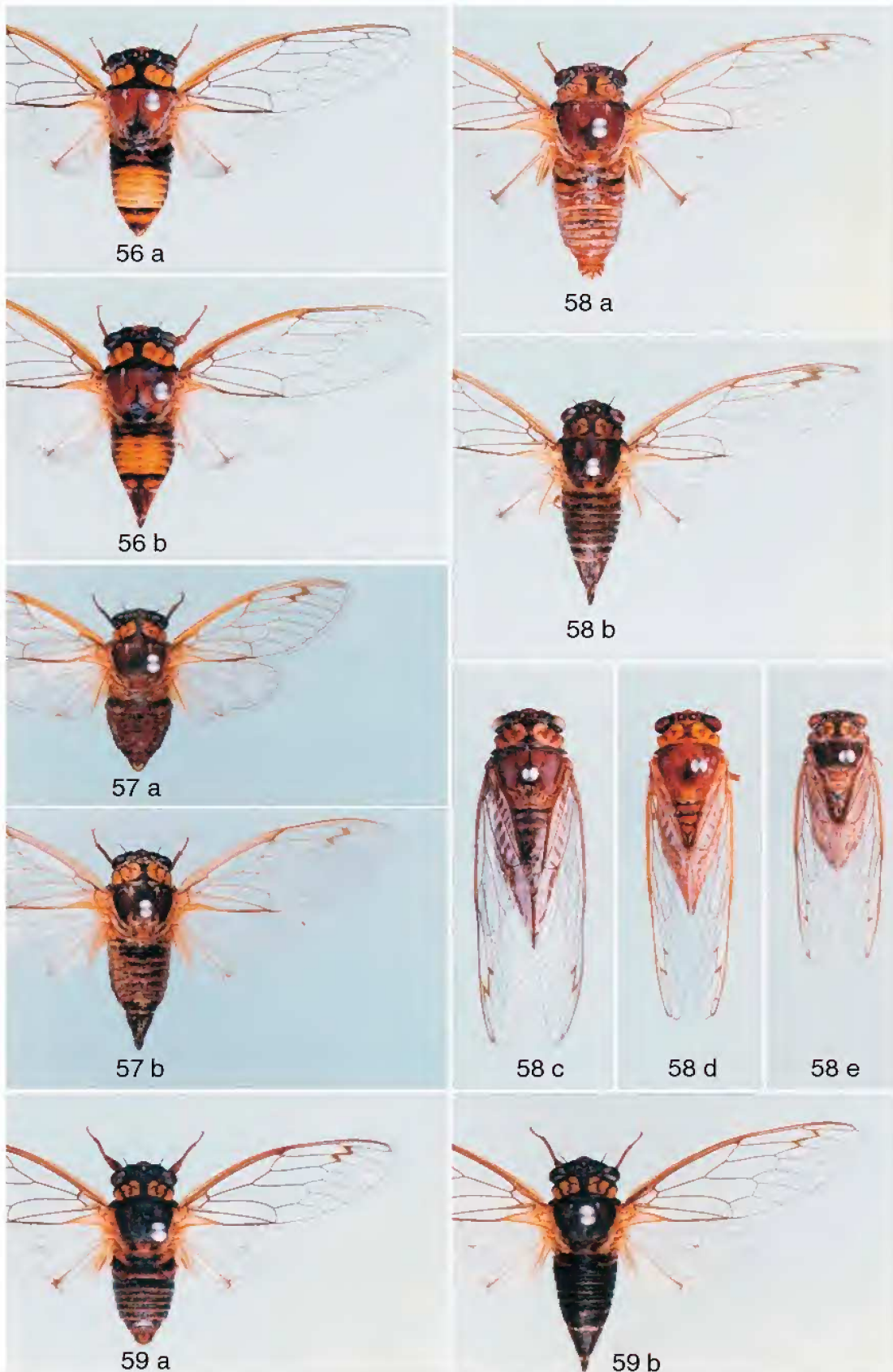
fascia based on anterior margin and extending back to around one third the length of mesonotum; cruciform elevation with basal area light brown divided by a dark fascia along midline; usually covered to some extent by silver pubescence, sometimes substantially. Thorax below yellowish brown to dark brown. *Wings*. Hyaline. Fore wings always with a black infuscation at base of apical cells 2 and 3, these sometimes fused along Rs forming a single zigzag infuscation; venation usually tending black but sometimes partially brown; basal cell usually opaque amber, sometimes weakly opaque or even nearly hyaline; basal membrane muddy-yellow to black, usually a mixture of both; costal veins and most others bearing a little silver pubescence not always obvious to naked eye, this pubescence often in small dispersed clusters. Hind wings with a heavy black infuscation along full length of 2A, expanded to varying degrees along wing margin; plaga broad along basal three quarters of 3A and along much of inner margin, usually tinted brown and bordered by heavy black infuscation; usually a small black infuscation near centre of wing at base of apical cell 4; venation light brown usually with ambient vein tending black. *Legs*. Yellowish brown to dark brown with no distinct markings. *Opercula*. Muddy pale yellow narrowly edged brown or black and normally covered by fine silver pubescence; almost meeting, extending laterally beyond lateral margins of abdomen and distally a little beyond tympanal cavities. *Abdomen*. Tergites dark ferruginous brown to almost black; sometimes showing slightly lighter pigmentation dorsally, to a lesser extent mid-laterally and occasionally along posterior edge of tergites; an area of distinct silver pubescence laterally on tergites 2 and 3. Sternites glossy black to varying degrees with at least lateral extremities partly dark brown; sternite VIII dark brown. *Tymbals* (Fig. 20). As for generic description. *Genitalia* (Figs. 46, 47). Pygofer dark ferruginous brown; upper pygofer lobes much shorter than dorsal beak, in lateral view almost as broad as long, tending bilobed, distal end terminated at an oblique angle, in ventral view clearly lying within margins of pygofer; basal lobes with outer and inner lobes of similar length and entirely fused by a broad webbing, in lateral view outer lobe tapering to a point confluent with webbing. Uncal lobes beak-like, nearly conical and tapering to a blunt point, gently curved downwards and slightly outwards near distal end. Conjunctival claws simple, sharply pointed, directed ventrally, flattened, broad in lateral view, narrow in ventral view. A small, sublateral, gently-rounded flange on either side of theca near distal end, visible when theca viewed ventrally or appearing as a small triangular lobe either side when theca viewed end-on. Palaris absent.

Female (Figs. 8, 50b,c). Colour and markings similar to those of male. Abdominal segment 9 dark reddish brown partly tending black on some specimens, usually very slightly paler along dorsal midline and subdorsally; dorsal beak black. Ovipositor sheath usually black or nearly so but sometimes dark reddish brown.

Measurements. KURANDA, NORTHERN QUEENSLAND: n = 10♂♂, 10♀♀ (includes largest and smallest of available specimens). Length of body: male 27.4–32.4 (29.7); female 32.1–38.1 (35.2). Length of fore wing: male 38.7–46.1 (42.6); female 43.0–50.0 (47.7). Width of head: male 10.0–11.6 (10.9); female 11.1–12.9 (12.1). Width of pronotum: male 10.4–12.8 (11.6); female 11.9–14.3 (13.1). CATHU STATE FOREST, NEAR EUNGELLA, CENTRAL QUEENSLAND: n = 10♂♂, 10♀♀ (includes largest and smallest of available



Figs. 52–55. *Tryella* species. (52) *T. kauma* n.sp.; a, male; b, female. (53) *T. adela* n.sp.; a, male; b, female. (54) *T. castanea* (Distant); a, c, males; b, d, e, females. (55) *T. ochra* n.sp.; a, male; b, female. Approx. 1.8 × natural size.



Figs. 56–59. *Tryella* species. (56) *T. lachlani* n.sp.; a, male; b, female. (57) *T. graminea* n.sp.; a, female; b, male. (58) *T. burnsi* n.sp.; a, e, males; b, c, d, females. (59) *T. willsi* (Distant); a, female; b, male. Approx. 1.8 × natural size.

specimens). Length of body: male 27.3–30.3 (28.9); female 31.3–34.7 (33.3). Length of fore wing: male 39.1–42.8 (40.7); female 41.5–45.4 (43.8). Width of head: male 10.2–10.9 (10.6); female 10.4–11.8 (11.2). Width of pronotum: male 10.8–11.8 (11.3); female 11.1–12.9 (12.2). FUNNEL CREEK, SOUTH-WEST OF SARINA, CENTRAL QUEENSLAND: n = 10 ♂♂, 3 ♀♀ (includes all available specimens). Length of body: male 21.3–24.6 (23.0); female 22.6–24.8 (23.6). Length of fore wing: male 30.2–33.3 (31.8); female 31.1–32.6 (31.8). Width of head: male 8.3–9.0 (8.6); female 8.3–9.1 (8.6). Width of pronotum: male 8.4–9.5 (8.9); female 8.3–9.5 (8.9). THEODORE, SOUTHEASTERN QUEENSLAND: n = 9 ♂♂, 10 ♀♀ (includes smallest and largest of available specimens). Length of body: male 23.3–25.6 (24.3); female 24.4–27.3 (26.1). Length of fore wing: male 32.1–35.2 (33.4); female 33.5–37.0 (35.2). Width of head: male 8.8–9.3 (8.9); female 8.6–10.0 (9.3). Width of pronotum: male 8.9–9.4 (9.2); female 9.1–10.3 (9.7). LANSDOWNE, NEAR TAREE, NSW: n = 10 ♂♂, 10 ♀♀ (includes largest and smallest of available specimens). Length of body: male 26.5–31.0 (29.0); female 28.5–36.6 (33.0). Length of fore wing: male 38.6–43.0 (41.3); female 40.2–47.9 (44.8). Width of head: male 10.3–11.3 (10.7); female 10.4–11.8 (11.3). Width of pronotum: male 10.8–12.1 (11.5); female 11.5–13.3 (12.4).

This is one of the largest species within the complex of *Abricta* and allied genera and is equalled only by *Abricta ferruginosa* from Mauritius. However, the size of specimens is markedly varied between localities, a phenomenon first noted by Moulds (1990). Individuals from areas receiving an average annual rainfall less than about 1000 mm are smaller than those from areas of high rainfall and lush vegetation (compare Kuranda and Funnel Ck measurements above). Thus, coastal specimens are usually much larger than inland specimens, except in some areas between Ayr and Bowen, and between Mackay and Rockhampton, where coastal rainfall approaches 1000 mm. Inland specimens usually have a fore wing length around 35 mm, never greater than 40 mm (note Funnel Ck and Theodore measurements). Individuals from coastal SE Qld and coastal NSW usually have a fore wing length above 40 mm (note Lansdowne measurements). Some of the largest specimens come from rainforest districts on the Atherton Tableland where a fore wing length above 43 mm is usual but length can sometimes reach over 50 mm (note Kuranda measurements).

Distinguishing features. The large size of this species, together with its usually pale pronotal midline and male opercula that extend laterally well beyond the body clearly characterize *curvicosta*.

Distribution (Fig. 60). Eastern Queensland and NSW from the Daintree River north of Cairns to Bendalong on the NSW South Coast. On the Atherton Tableland it is common around Julatten and Kuranda and less common around Atherton, Herberton and Ravenshoe; it also occurs in the mountains at Eungella west of Mackay, but elsewhere in Queensland it is essentially a lowland species. In central Queensland it is less common, but extends inland to the Springsure and Carnarvon Gorge. It is a common species in southeastern Queensland south from the Bundaberg district, and throughout much of its range in NSW. In far southeastern Queensland it occurs inland to Inglewood. In NSW it is mainly a lowland species and is not found west

of the Great Dividing Range, although in the north of the State it has been taken inland as far as Black Swamp near Tenterfield. Throughout the species' range there are no records from localities higher than 1000 m. In both the Brisbane and Sydney regions it is widespread, often occurring in the suburbs, and it is common in some years on the eastern slopes of the Blue Mountains as high as Springwood.

Adults have been taken on the Atherton Tableland from late December to early March, in southeastern Queensland from late September to June, and around Sydney from late November to mid April. In all localities adults are usually most common during the latter half of December and in January (Moulds, 1990).

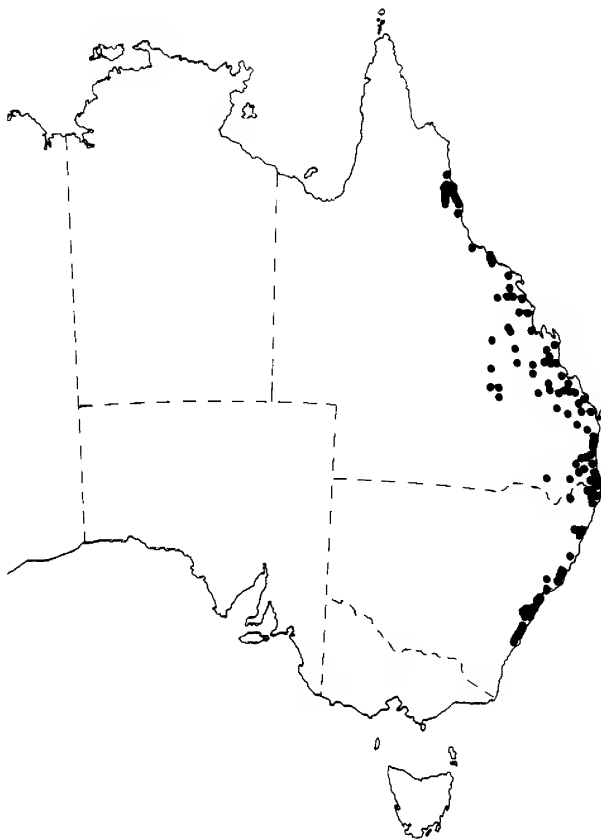


Fig. 60. Known distribution of *Aleeta curvicosta* (Germar).

Habitat. *Aleeta curvicosta* is associated with a wide variety of habitats and plant species but is most often found on species of the family Myrtaceae (Moulds, 1990).

Song. Characteristics of the song are summarized by Moulds (1990).

Biology. G.A. Williams (pers. comm.) has observed extensive oviposition of *Aleeta curvicosta* at his property at Lansdowne near Taree on the NSW North Coast. He maintains a small orchard adjacent to his house in a clearing bordered by both rainforest and wet sclerophyll forest. His stone fruits in particular have been heavily attacked causing considerable damage to branches which later break under fruit load. Sear damage to stems and young trunks was also prevalent. Females have been observed ovipositing on the following shrubs and trees in or near that orchard [species

marked by an asterisk (*) have sustained moderate to heavy branch damage]; FRUIT AND NUT TREES: White Sapote, *Casimiroa edulis* (Rutaceae); Lime, *Citrus aurantiifolia* (Rutaceae); Grapefruit, *Citrus × paradisi* (Rutaceae); Mandarin, *Citrus reticulata* (Rutaceae); Orange, *Citrus sinensis* (Rutaceae); Macadamia, *Macadamia tetraphylla* (Proteaceae); Black Sapote, *Diospyros digyna* (Ebenaceae); Persimmon, *Diospyros kaki* (Ebenaceae); Cherimoya, *Annona cherimola* (Annonaceae); Guava, *Psidium guajava* (Myrtaceae); *Cucumber tree, *Averrhoa bilimbi* (Oxalidaceae); *Pomegranate, *Punica granatum* (Punicaceae); *Apple, *Malus* sp. var. (Rosaceae); *Pear, *Pyrus* sp. var. (Rosaceae); *Plum, *Prunus* sp. var. (Rosaceae); *Apricot, *Prunus armeniaca* (Rosaceae); Capulin cherry, *Prunus salicifolia* (Rosaceae); *Peach, *Prunus persica* (Rosaceae); *Nectarine, *Prunus persica* var. *nucipersica* (Rosaceae); Pecan, *Carya illinoensis* (Juglandaceae); Almond, *Prunus dulcis* (Rosaceae). OTHER EXOTIC TREES AND SHRUBS: African tulip tree *Spathodea campanulata* (Bignoniaceae); Jacaranda, *Jacaranda mimosifolia* (Bignoniaceae); Yellowbells, *Tecoma stans* (Bignoniaceae); Buddleia, *Buddleja davidii* (Buddlejaceae). AUSTRALIAN NATIVES: Macadamia, *Macadamia integrifolia* (Proteaceae); *Rhodomyrtus psidioides* (Myrtaceae); *Glochidion ferdinandii* (Euphorbiaceae); **Buckinghamia celsissima* (Proteaceae); *Stenocarpus sinuatus* (Proteaceae). Oviposition has also been recorded as occurring on Lisbon lemon, *Citrus limon* (Rutaceae) (Anonymous, 1948).

The only known nymphal food plants are confined to native species within the Myrtaceae and include several species of *Melaleuca* (including *M. quinquenervia*) and *Callistemon* spp. which are often favoured in suburban gardens. Two native species that are favoured by adults, *Lysicarpus angustifolius* (another Myrtaceae) and *Lysiphylum hookeri* (family Caesalpiniaceae) (Moulds, 1990; J. Moss, pers. comm.), are also very likely nymphal food plants.

Further details on oviposition and nymphal biology are given by Moulds (1990).

Genus *Tryella* n.gen.

Type species: *Tryella ochra* n.sp.

Included species: *adela* n.sp., *burnsi* n.sp., *castanea* (Distant), *crassa* n.sp., *graminea* n.sp., *infusca* n.sp., *kauma* n.sp., *lachlani* n.sp., *noctua* (Distant), *occidens* n.sp., *ochra* n.sp., *rubra* (Goding & Froggatt), *stalkerii* (Distant), *willsi* (Distant).

Etymology. Derived from the Greek *tryelis* meaning ladle or stirrer and pertaining to the prominent ladle-like or scoop-like uncal lobes of this genus.

Diagnosis. Postclypeus slightly to moderately produced. Rostrum almost reaching or slightly passing hind coxae. Ocelli amber to ruby red. Width of head including eyes as wide as or slightly narrower or wider than anterior part of pronotum and as wide as or narrower than mesonotum; width of abdomen equal to that of thorax. Pronotal collar narrow with lateral angles ampliate and rounded; rudimentary and essentially confluent with adjoining sclerites anterior of lateral angles. Wings hyaline or with very weak translucent tint. Fore wing with or without infuscation;

costal margin ampliate to node, the maximum dilation greater than width of costal vein; basal cell usually with translucent pigmentation, hyaline in some species. Hind wing plaga broad along much of vein 3A plus inner margin of anal lobe, narrow along vein 2A usually to its distal end; plaga usually edged by black infuscation partly expanded along wing margin at distal end of 2A. Tymbals (Figs. 22–29) with 9–11 long ribs evenly spaced but slightly converging dorsally; basal plate small. Male opercula almost tear-drop in shape, weakly angled inwards before midpoint; nearly flat; meeting or almost meeting and extending distally to or just beyond limits of tympanal cavities. Body and basal wing veins bearing silver pubescence, varying in degree between species but most abundant on newly emerged individuals.

Male genitalia (Figs. 48–49, 67–74, 79–86, 92–101) with pygofer dorsal beak large, long and pointed; upper pygofer lobes strongly developed in most species but in some short and robust; basal pygofer lobes usually divided into a primary outer and secondary inner lobe (undivided in *occidens*), the outer lobe in lateral view either long and finger-like or substantially webbed to inner basal lobe. Uncal lobes widely separated; in ventral view somewhat scoop-like, the distal end of each upturned and cupped; in lateral view with a wing-like lateral process near base, sometimes short, sometimes long. Aedeagus in lateral view straight or gently curved for most of its length, basal plate a fused pair of nearly circular discs; conjunctival claws directed laterally or ventrally, robust, claw-like; some species with a flabellum and/or palearis.

Female abdominal segment 9 long, nearly conical; ovipositor (Figs. 9–14) long, in lateral view with modest dorsal and ventral slopes, wedge-shaped; ovipositor sheath reaching to or a little beyond apex of dorsal beak.

Distinguishing features. The scoop-like uncal lobes and wing-like lateral processes of the uncus are unique to *Tryella* species. *Tryella* species also differ from allied genera except *Aleeta* by having the fore wing costa strongly ampliate to node, the maximum dilation clearly wider than costal vein. The conjunctival claws at distal end of male theca are far more developed in *Tryella* than in other genera.

Remarks. The separation of *Tryella* from *Aleeta* (its sister group in Australia) is strongly supported both by electrophoretic data (Serkowski & Moulds, unpub. data) and the cladistic analyses. Electrophoretic data show a long genetic distance between the six *Tryella* species examined and *Aleeta curvicosta*, while cladistic analyses of morphological data show strong character support for this generic separation (Figs. 15–17). For details see Rationale for New Taxa, pp. 254–255.

Distribution. Mainly tropical and subtropical Australia, both coastal and inland, but also central Australia, temperate eastern Australia and southwestern Papua New Guinea.

Habitat. The majority of species inhabit trees and shrubs, especially Eucalyptus and other Myrtaceae. One species, *T. graminea*, is confined to grass. Adults inhabiting trees and shrubs perch along the trunks and branches, but are found most often on those with a diameter less than 50 mm.

Biology. In monsoonal and arid regions adults mostly emerge after heavy summer rains. Eggs are probably laid in live plant tissue but this requires confirmation.

Adults of all species tend to group together in local aggregations, those of some species even clustering on just one or several adjoining trees or shrubs. They are active both during the day and at dusk and all species, except perhaps *graminea*, are readily attracted to light. In fact the

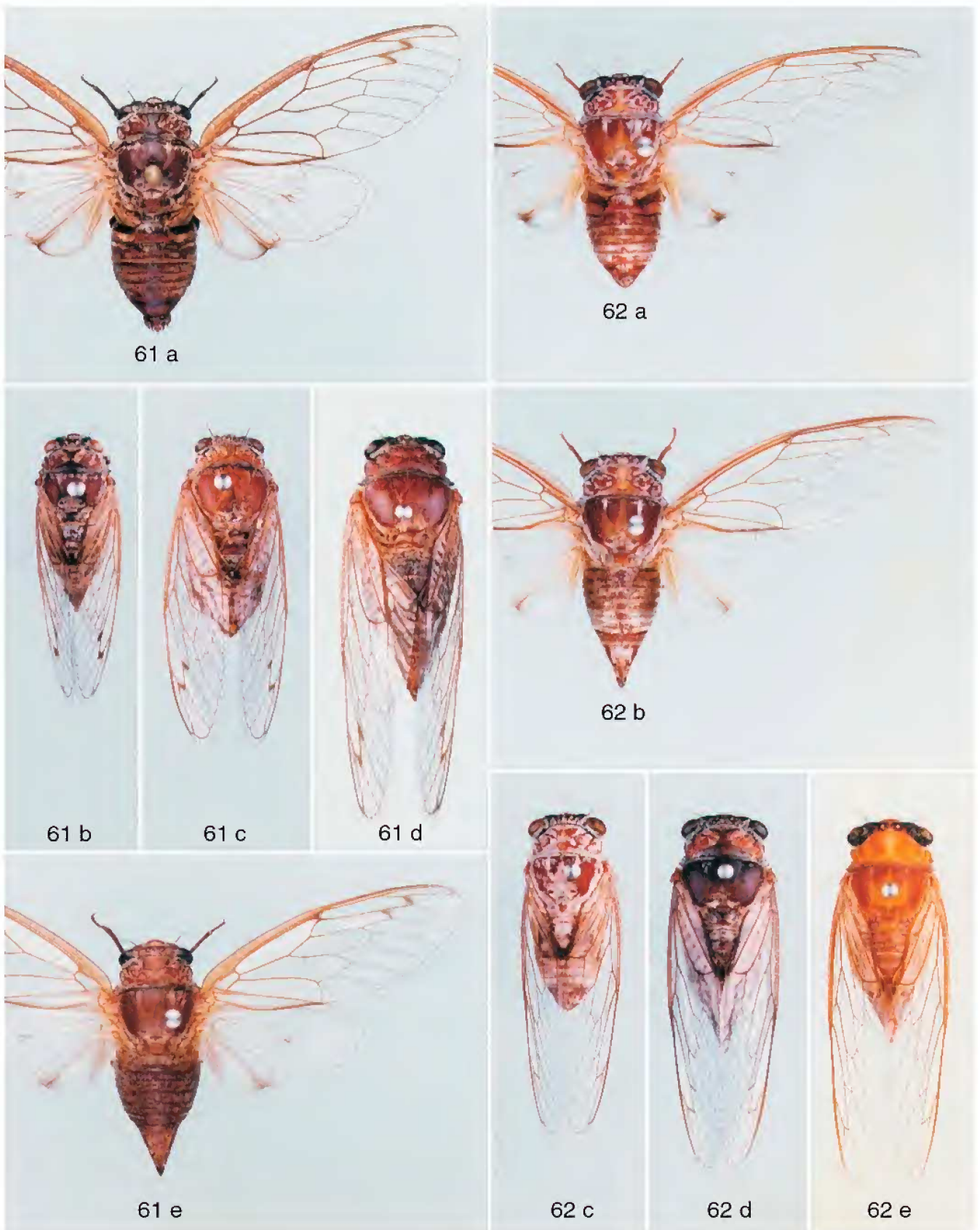
large majority of specimens in collections has been taken in this way.

Males call both during the day and at dusk. Calling males tend to aggregate and singing usually occurs in chorus.

Key to species of *Tryella*

Close similarities between some species, which overlap intraspecific variation, made the task of compiling a key difficult. Consequently several species key at multiple points, although the key has been designed, as far as possible, to provide a fast determination for typical specimens. Most general specimens will not key correctly.

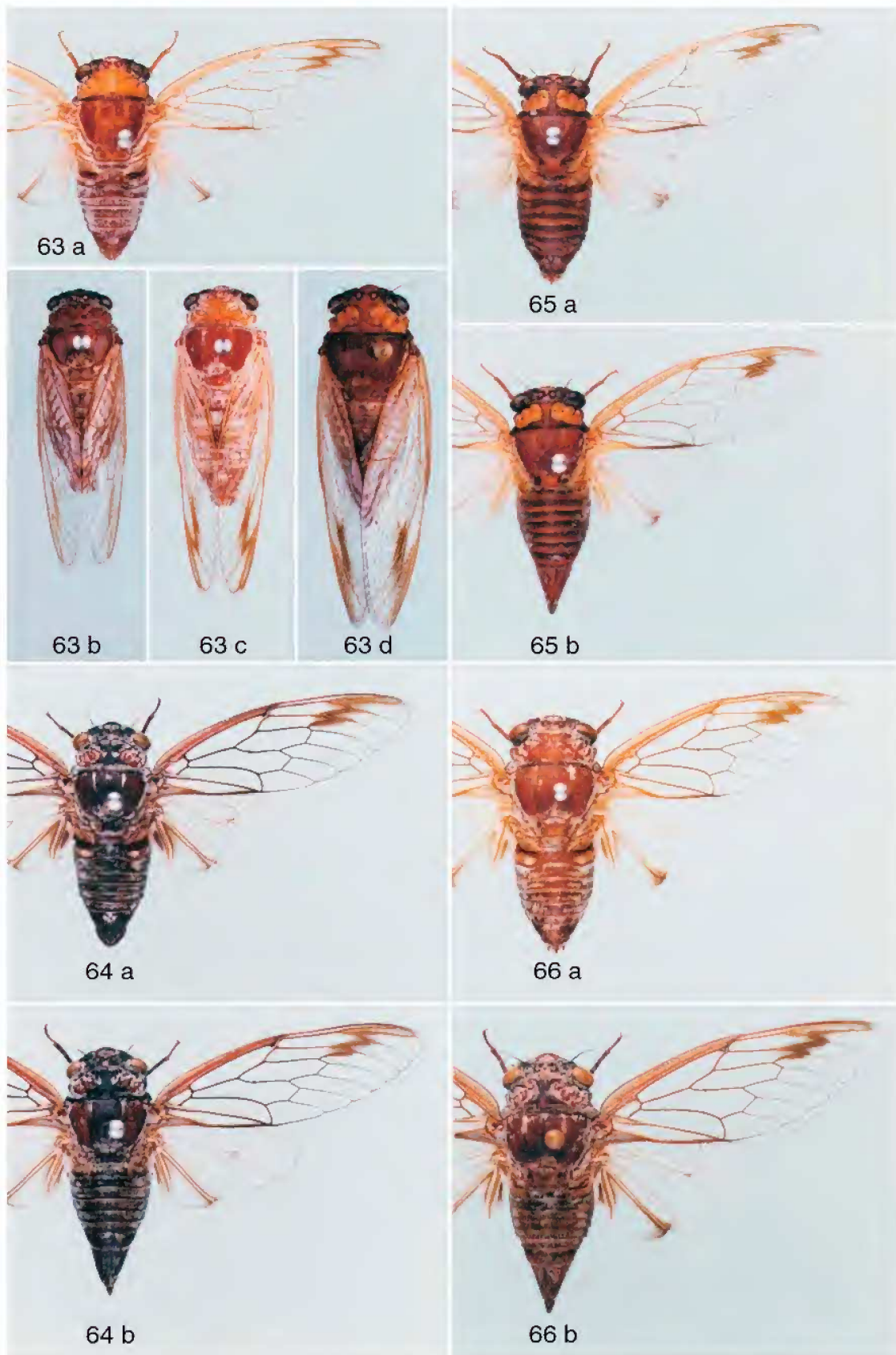
- 1 Pronotum with a darkened midline clearly marked and in a contrasting tone 2
 — Pronotum more or less of even tone *or* with midline pale 23
- 2 Fore wing with infuscations (pigmented patches) 3
 — Fore wing without infuscations 16
- 3 A black or very dark insect, the mesonotum and abdominal tergites entirely black *or* sometimes black and partly deep reddish brown, mostly on thorax 4
 — Mesonotum and abdominal tergites never *both* black or nearly so 16
- 4 Fore wing with a bold infuscation that reaches to, or very nearly to, top of 3rd ulnar cell (C. Australia and inland W.A.) 5
 — Fore wing with infuscation that does not approach anywhere near to top of 3rd ulnar cell (inland Qld) *willsi* Distant
- 5 Postclypeus ferruginous (deep reddish brown) *occidens* n.sp.
 — Postclypeus black or nearly so *noctua* Distant
- 6 Wings in folded position with apex of hind wing reaching, or very nearly reaching, distal end of 2nd ulnar cell 7
 — Wings in folded position with apex of hind wing not reaching distal end of 2nd ulnar cell 11
- 7 Hind wing anal lobe suffused golden amber on basal $\frac{1}{2}$ to $\frac{2}{3}$ (clearly visible when specimen is held 10 cm or so above a white background) 8
 — Hind wing anal lobe without golden amber suffusion 9
- 8 Hind wing infuscation at distal end of vein 2A small or absent, rarely extending part way along margin of anal lobe; male pygofer in lateral view (Fig. 92) with basal lobe short, upper pygofer lobe with a broad upturned pointed apex (NT & Qld) *graminea* n.sp.
 — Hind wing infuscation at distal end of vein 2A bold and usually with an obvious extension part way along margin of anal lobe; male pygofer in lateral view (Fig. 71) with basal lobe very long, slender and finger-like, upper pygofer lobe tapering to a blunt point (inland districts below the Gulf of Carpentaria both in Qld and NT) *infuscata* n.sp.
- 9 Fore wing with a bold infuscation (Fig. 63a) that reaches to, or very nearly to, distal end of 3rd ulnar cell (Pilbara region of WA) *stalkerii* Distant
 — Fore wing with infuscation that does not approach anywhere near distal end of 3rd ulnar cell (Fig. 61a) 10
- 10 Pronotum (except for darkened midline) clearly paler than mesonotum; fore wing basal membrane nearly always clearly orange (E. Kimberley, monsoonal NT and lower Gulf region of Qld) *castanea* Distant
 — Pronotum similar in colour to mesonotum; fore wing basal membrane rarely approaching orange (atypical specimen; rarely encountered) (NT and Qld) *crassa* n.sp.



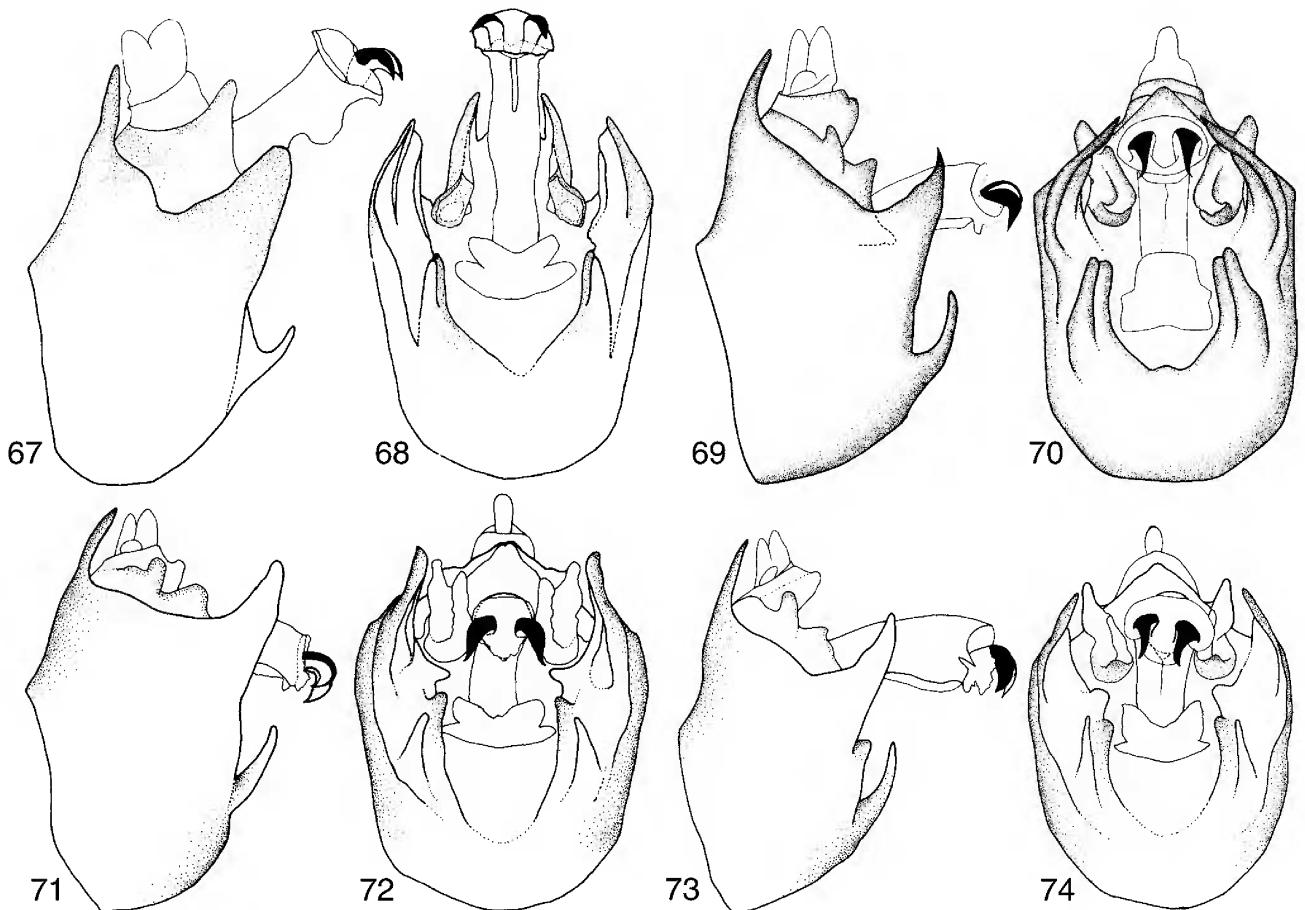
Figs. 61–62. *Tryella* species. (61) *T. crassa* n.sp.; a,c, males; b,d,e, females. (62) *T. rubra* (Goding & Froggatt); a,c, males; b,d,e, females. Approx. 2.0 × natural size.

- 11 Cruciform elevation black and much of abdomen dorsal side similar in colour to that of pronotum (Cape York Peninsula) *lachlani* n.sp.
 — Not with above *combination* of characters 12
- 12 Mesonotum with a large pale area immediately anterior of cruciform elevation, never darker than remainder (Qld and lower Gulf region of NT) *ochra* n.sp.
 — Mesonotum never with a pale area immediately anterior of cruciform elevation, *usually* with this area black or unicolorous 13
- 13 Fore wing infuscation covering, or almost covering, entire basal vein of 4th apical cell (Fig. 65a) (inland districts below the Gulf of Carpentaria both in Qld and NT) *infusata* n.sp.
 — Fore wing infuscation never extending beyond base of 3rd apical cell (Fig. 58a) (3 very similar species but with distinctly different male genitalia and different geographic locations) 14
- 14 Male genitalia in lateral view with basal pygofer lobe very long, slender and finger-like (Fig. 83); female indistinguishable except by locality (E. Kimberley, monsoonal NT and lower Gulf region of Qld) *castanea* Distant
 — Male genitalia in lateral view with basal pygofer lobe short and not like a very long thin finger (Figs. 96, 98) (Qld) 15
- 15 Male genitalia in ventral view with flabellum a single broad rounded lobe (Fig. 97); female indistinguishable except by locality (lower Gulf districts of Qld) *kauma* n.sp.
 — Male genitalia in ventral view with flabellum almost divided into a pair of lobes (Fig. 99) (tropical Qld south from Iron Range) *burnsi* n.sp.
- 16 Length of fore wing rarely below 22 mm; fore wing basal cell weakly but clearly pigmented; fore wing basal membrane orange 17
 — Length of fore wing never reaching 22 mm; fore wing basal cell hyaline; fore wing basal membrane usually pale yellowish, crimson red, or sometimes orange 21
- 17 Cruciform elevation black (upper Cape York Peninsula and PNG) *lachlani* n.sp.
 — Cruciform elevation brown, similar in tone to remainder of mesonotum 18
- 18 Pronotum dark reddish brown and barely paler than mesonotum (atypical specimen; rarely encountered) (Kimberley region of WA and monsoonal NT) *rubra* Goding & Froggatt
 — Pronotum ochraceous and clearly paler than mesonotum 19
- 19 Mesonotum with a large black blotch in front of cruciform elevation and front of head between eyes and base of postclypeus always brown (atypical specimen; rarely encountered) (tropical Queensland south from Iron Range) *burnsi* n.sp.
 — Mesonotum usually without a black blotch in front of cruciform elevation, if present then front of head black 20
- 20 Hind wing anal lobe usually with distinct golden amber suffusion; male genitalia in lateral view with upper pygofer lobe sharply pointed (Fig. 69); female indistinguishable except by locality (Qld and lower Gulf region of NT) *ochra* n.sp.
 — Hind wing anal lobe without golden amber suffusion; male genitalia in lateral view with upper pygofer lobe rounded at apex (Fig. 83) (a specimen with atypical wing markings; rarely encountered) (E. Kimberley, monsoonal NT and lower Gulf region of Qld) *castanea* Distant

- 21 Rostrum passing beyond bases of hind coxae but never reaching their apices (lower Gulf region of Qld) *kauma* n.sp.
 — Rostrum reaching or almost reaching only bases of hind coxae (Northern Territory) 22
- 22 Male genitalia in lateral view with upper pygofer lobe very broad at base and tapering to a narrow rounded point (Fig. 83); basal lobe of pygofer extended into a long finger-like projection (Fig. 83); female indistinguishable (a form known only from the Victoria River, NT) *castanea* Distant
 — Male genitalia in lateral view with upper pygofer lobe broad and showing almost no taper to a broad blunt apex (Fig. 85); basal lobe of pygofer with projection short and gradually tapering to apex (Fig. 85) (monsoonal NT, but probably not extending W to Victoria R.) *adela* n.sp.
- 23 Pronotum with midline pale 24
 — Pronotum with midline dark or similar in tone to remainder 25
- 24 Wings absolutely glass clear (not withstanding infuscations) (Kimberley region of WA and monsoonal NT) *rubra* Goding & Froggatt
 — Wings weakly tinted brown, clearly visible when held above a white background (atypical specimen; rarely encountered) (NT and Qld) *crassa* n.sp.
- 25 Fore wing with a bold infuscation that reaches to, or very nearly to, top of 3rd ulnar cell (Fig. 63a) 26
 — Fore wing either without infuscations or infuscations that do not approach anywhere near top of 3rd ulnar cell (Fig. 61a) 28
- 26 Pronotum with a black midline (C. Aust. and inland WA) *noctua* Distant
 — Pronotum with a brown midline 27
- 27 Hind wing plagal area along vein 3A with obvious black pigmentation (northwestern WA) *occidens* n.sp.
 — Hind wing plagal area along vein 3A with no black pigmentation (black only along or at distal end of vein 2A) (Pilbara region of Western Australia) *stalker*i Distant
- 28 Pronotum much paler than mesonotum 29
 — Pronotum similar in colour to mesonotum 30
- 29 Hind wing anal lobe usually with distinct golden amber suffusion; male genitalia in lateral view with upper pygofer lobe sharply pointed (Fig. 69); female indistinguishable except by locality (Qld and lower Gulf region of NT) *ochra* n.sp.
 — Hind wing anal lobe without golden amber suffusion; male genitalia in lateral view with upper pygofer lobe rounded at apex (Fig. 83) (a specimen with atypical wing markings, rarely encountered) (E. Kimberley, monsoonal NT and lower Gulf region of Qld) *castanea* Distant
- 30 Fore wing infuscation sometimes totally absent, if present wings in folded position with apex of hind wing clearly not reaching infuscation on fore wing (Kimberley region of WA and monsoonal NT) *rubra* Distant
 — Fore wing infuscation always present; wings in folded position with apex of hind wing reaching, and usually overlapping, infuscations on fore wing 31
- 31 Fore wing venation dark brown or black (NT and Qld) *crassa* n.sp.
 — Fore wing venation light brown or yellowish (Pilbara region of WA) *stalker*i Distant



Figs. 63–66. *Tryella* species. (63) *T. stalker* (Distant); *a, b, c*, males; *d*, female. (64) *T. noctua* (Distant); *a*, male; *b*, female. (65) *T. infuscata* n.sp.; *a*, male; *b*, female. (66) *T. occidentis* n.sp.; *a*, male; *b*, female. Approx. 1.7 × natural size.



Figs. 67–74. Male genitalia of *Tryella* species showing pygofer with uncus and aedeagus in right lateral view (left) and ventral view (right): (67–68) *T. stalkeri*, genitalia prep. AB50; (69–70) *T. ochra*, genitalia prep. AB7; (71–72) *T. infuscata*, genitalia prep. AB86; (73–74) *T. lachlani*, genitalia prep. AB87.

***Tryella adela* n.sp.**

Figs. 53a,b, 75, 85, 86

Types. NORTHERN TERRITORY Holotype ♂, K179857, 38 km N of Daly Waters, Stuart Hwy, 23.xii.1986, M.S. & B.J. Moulds, AM. Paratypes as follows: 1♂, K179858, same data as holotype, AM. 4♂♂ (one male genitalic preparation no. AB49), 1♀, Tindal, 1–20.xii.1967, W. Vestjens; 1♀, Tindal, 14.31'S 132.22'E, 1–20.xii.1967, W.J.M. Vestjens; all in ANIC. 1♀, Bulman Aboriginal Comm., S Arnhem Land, nr Mainoru Stn, 25.xi.1981, A. Walford-Huggins; 1♂, 2♀♀, Waterhouse River, Mataranka Hsd, 23.xii.1986, MBM; 13♂♂ (2 male genitalic preparations nos AB1, AB2), 3♀♀, same data as holotype; 3♂♂, 1♀, 10 km N of Daly Waters, 8.xii.1982, A. Walford-Huggins; all in MSM.

Other material examined. NORTHERN TERRITORY 2♂♂ (teneral), 1♀ (teneral), Tindal, 1–20.xii.1967, W. Vestjens; all in ANIC.

Etymology. Derived from the Greek *adelos* meaning unseen, unknown, obscure, and referring to the small size and apparent scarcity of this species.

Description

Male (Figs. 53a, 85, 86). *Head.* Usually black but sometimes brownish; often black with a pair of brown spots between lateral ocelli and eyes, and on midline against posterior margin, visible only under magnification; postclypeus and anteclypeus ferruginous. Rostrum ferruginous becoming black apically but always with extreme apex dark brown; reaching

or almost reaching bases of hind coxae. Antennae black or brown, usually with basal segment, and sometimes part of second segment, brown. Without extensive silver pubescence above but usually extensive below except on clypeus. *Thorax.* Pronotum ochraceous with a broad middorsal fascia, pale to very dark ferruginous or sometimes nearly black, this fascia spreading laterally both at its anterior end against pronotal margin to about eyes and at its posterior end against pronotal collar; pronotal collar ferruginous to nearly black but always pale anterior of lateral angles. Mesonotum ferruginous and usually very dark immediately anterior of cruciform elevation and along lateral margins above wing bases; cruciform elevation usually light brown but sometimes dark. Thorax above often lacking noticeable silver pubescence; below medium to light ferruginous and always with distinct fine silver pubescence. *Wings.* Hyaline. Fore wings without infuscations; venation brown, costa pale to medium ochraceous but sometimes tinted ferruginous; basal cell hyaline; basal membrane orange or orange yellow. Hind wings with a weak infuscation at the distal end of vein 2A, often extending along much of the length of 2A, sometimes also overlaying off white plaga; venation brown. *Legs.* Light to medium brown; without markings. *Opercula.* Muddy yellow, usually with narrow black edge along lateral margin; usually covered by silver pubescence not always obvious to naked eye; clearly separated exposing apex of sternite I and barely concealing tympanal cavities. *Abdomen.* Tergites medium to dark ferruginous, sometimes black or darkened

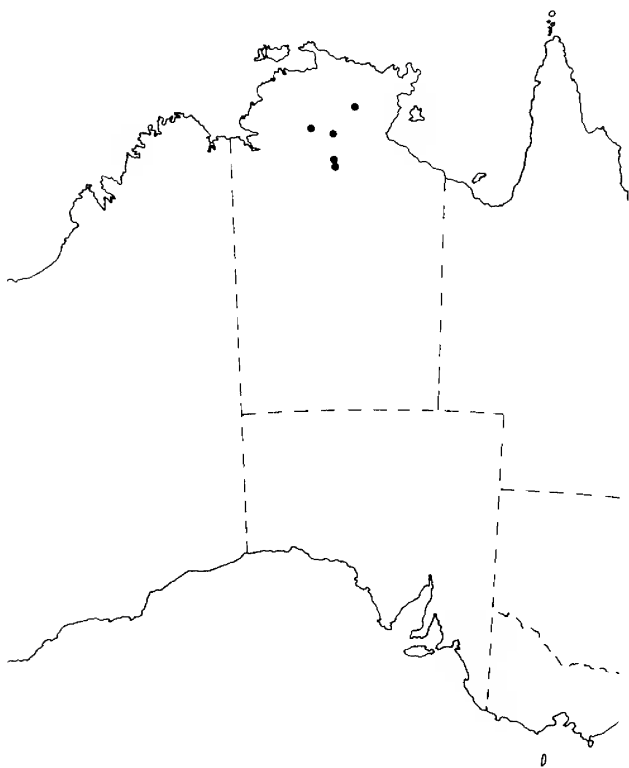


Fig. 75. Known distribution of *Tryella adela* n.sp.

on tergite 1 and anterior half of tergites 2, 3 and 8, occasionally so on 4–7. Sternites light brown, often with an irregular, broad, darkened midline that usually excludes sternite VIII. Abdomen above and below often with silver pubescence not always visible to naked eye. *Tymbals*. Usually 9 long tymbal ribs, otherwise as for generic description. *Genitalia* (Figs. 85, 86). Pygofer ferruginous; upper pygofer lobes in lateral view broad and almost straight with nearly parallel sides and a broad rounded apex, in ventral view angled slightly inwards before midpoint; basal lobes with a broad webbing fusing outer and inner lobes, in lateral view outer lobe just a short finger-like projection beyond webbing. Uncal lobes scoop-like and gently upturned at their distal ends; lateral processes of uncus in lateral view small and rounded. Conjunctival claws simple, sharply pointed, directed laterally. Flabellum produced on either side into a small triangular lobe and centrally as a low rounded lobe. Palaris absent.

Female (Fig. 53b). Colour and markings similar to male. Abdominal segment 9 brown, tending palest ventrally; dorsal beak usually black or nearly so. Ovipositor sheath black and clearly extending beyond dorsal beak.

Measurements. $n = 10 \text{♂♂}$, 10♀♀ (includes smallest and largest of available specimens). *Length of body*: male 12.4–13.5 (13.0); female 13.4–15.4 (14.3). *Length of fore wing*: male 16.1–18.2 (17.3); female 16.7–20.5 (18.8). *Width of head*: male 4.4–5.1 (4.9); female 4.6–5.3 (4.9). *Width of pronotum*: male 4.6–5.1 (4.9); female 4.8–5.7 (5.2).

Distinguishing features. Within its geographic range *T. adela* is most likely confused with *T. castanea*. Where these two species are sympatric *castanea* usually has a fore wing length greater than 22 mm, infuscations and a pigmented

basal cell. *Tryella adela* is normally smaller (fore wing length never reaching 22 mm), the fore wings are normally not infuscated and the fore wing basal cell is hyaline; male genital structures show clear differences and should be examined in doubtful cases.

Furthermore *T. adela* shows a very close resemblance to *castanea* from the Victoria River district of NT and to *T. kauma* from Queensland; *adela* differs from Victoria River *castanea* by having the fore wing basal cell hyaline instead of weakly tinted or partly tinted translucent amber, and from *kauma* by having the rostrum not passing the bases of the hind coxae and by lacking any brown on antennal plates on specimens with blackened heads.

Distribution (Fig. 75). Inland tropical Northern Territory where it is known from a relatively small area bordered approximately by Katherine, Bulman Aboriginal Community in south Arnhem Land and Daly Waters. Adults have been recorded only in late November and throughout December.

Habitat. Open woodland with shrubs. Nearly all adults have been taken at light but it is more likely that they inhabit shrubs rather than trees.

Tryella burnsi n.sp.

Figs. 9, 22, 58a–e, 76, 98, 99

Types. QUEENSLAND—Holotype ♂, K179853, Morehead R. x-ing, 35 km SSE of Musgrave Hsd, Cape York Pen., 10.i.1988, M.S. & B.J. Moulds, AM. Paratypes as follows: 8♂♂, K179928–K179935, 3♀♀, K179936–K179938, Claudie R., 4 mi W Mt. Lamond, 16.xii.1971, D.K. McAlpine, G.A. Holloway & D.P. Sands; 1♂, K179939, Claudie R., 1 mi W Mt. Lamond, 19.xii.1971, D.K. McAlpine, G.A. Holloway & D.P. Sands; 1♀, K179943, 2 mi S Mt. Lamond, Iron Range, 17.xii.1971, D.K. McAlpine & D.P. Sands; 2♂♂, K179940 and K179944, 1♀, K179941, Claudie River near Mount Lamond, 4.i.1972, D.K. McAlpine & G.A. Holloway; 2♂♂, K179945 and K179946, Lockhart R. Community new site, near Claudie River, 8.12.i.1972, S. Thomson; 1♀, K179854, same data as holotype; 1♂, K179942, 12 mi N Mount Molloy, 10.xii.1971, D.K. McAlpine, G.A. Holloway & D.P. Sands; 1♂, K179898, Mt. Molloy Airport, 25.xii.1981, A. Walford-Huggins; 1♂, K179980, Almaden, xii.1925, N.D. Campbell; 12♂♂, K179914–K179925, 2♀♀, K179926 and K179927, Speewah Rd, 5 mi S of Kuranda, 11.i.1967, D.K. McAlpine & G.A. Holloway; 1♂, K47518, Bowen, i.1923, E.H. Rainford; 1♂, K179855, Balnagowan, W of Mackay, 24.xii.1984, E.E. Adams; all in AM. 1♀, Townsville, 21.i.1958, K.L. Harley, ANIC. 3♂♂ (1 male genitalic preparation no. AB10), Iron Range, 2.6.i.1964, M.S. Moulds; 3♀♀, Iron Range, 26.xii.1983, MBM; 1♀, Iron Range, 22.x.1976, J. North; 2♂♂, Iron Range, 26.xii.1983, G. Wood; 1♂, Claudie River, Iron Range, 18.x.1974, G. Daniels; 2♂♂, 1♀, Claudie River, Iron Range, 8.20.x.1974, M.S. Moulds; 1♂ (1 genitalic preparation no. AB4), W Claudie River, Iron Range, 25.xii.1983, MBM; 1♀, Gordon Creek, Iron Range, 16.x.1974, M.S. Moulds; 1♂, York Downs 50 km E of Weipa, 28.xii.1983, MBM; 6♂♂, 2♀♀, waterhole nr Wenlock Riv. x-ing, Portland Roads Rd, 120 m, 13°06'S 142°56'E, 1.i.1995, GAD; 1♂, Old Lockhart River Mission, S of Iron Range, 25.x.1974, A. Daniels; 3♂♂, [Old] Lockhart River [Mission], 12°58'S 143°30'E, 14.17.xii.1986, R.B. Lachlan; 1♂, McIlwraith Rg, Leo Creek track, NE of Coen, 300 m, 2.i.1983, MBM; 1♂, McIlwraith Ra, 8 km NE of Coen, 13°53'S 143°15'E, 540 m, eucalypt woodland, 8.i.1995, G. and A. Daniels; 1♂, Coen, 29.xii.1993, MBM; 2♂♂, 18 km S of Coen, 24.xii.1983, MBM; 1♂, Barrow Point, 14°22'S 144°38'E, 13.xii.1986, R.B. Lachlan; 1♂, Little Laura River, 15 km NE of Laura, 1.i.1983, R. Storey; 1♂, 2 km S of Hann R. x-ing, 80 km NW of Laura, 15°18'S 143°53'E (gps), 29.xii.1993, MBM; 1♂, 16 km SE of Hann R. x-ing, NW of Laura, 12.i.1990, MBM; 4♂♂, 2♀♀, same locality as holotype, 10.i.1988, 9.i.1990, MBM; 3♂♂, Hells Gate Creek, S of Laura, 6.7.i.1981, GAD; 2♂♂, 35 km SE of Laura, 23.xii.1983, MBM; 1♂, Normanby R. x-ing, 2.i.1994, 15°17'S

144°50'E (gps), MBM; 1♂, 1♀, Cooktown, 7.i.1973, M.S. Moulds; 2♂♂, Mt. Cook nr Cooktown, 31.xii.1983, MBM; 1♀, Grassy Hill, Cooktown, 21.i.1990, C. Pratt; 1♂, Black Mountain, S of Cooktown, 6.i.1981, MBM; 2♂♂, Black Mountain, nr Cooktown, 7.i.1992, L.R. Ring; 1♂, Spear Creek, 8.5 km N of Palmer River x-ing, 16°03'S 144°48'E, 26.xii.1984, GAD; 1♂, McLeod River, W of Mt Carbine, 1.i.1981, MBM; 2♂♂, 1♀, Mt Molloy, 1,2,4.i.1974, AMW-H; 1♂, Rifle Creek, Mt Molloy, 9.i.1992, L.R. Ring; 2♂♂, 3 km S of Mount Molloy, 16°42'S 145°20'E, 7.xii.1991, C.J. Burwell; 5♂♂ (1 male genitalic preparation no. AB59), 1♀, Mt Molloy airport, 25.xii.1981, A. Walford-Huggins; 1♀, 10 mi S of Mt Molloy, 22.xii.1973, AMW-H; 3♂♂ (1 male genitalic preparation no. AB60), 4♀♀, Mareeba, 1.i.1983, G. Wood; 4♂♂, Arriga via Mareeba, 17.xi.1981, i.1990, K.H. Halfpapp; 1♀, Walsh Bluff, 17 km NW of Atherton, 30.xi.1986, D.A. Lane; 1♂, 20 km W of Atherton, 16.xi.1986, D.A. Lane; 1♀, Kuranda, 11.i.1980, G. Wood; 2♀♀, Clohesy River, Mareeba road, 28.xii.1973, AMW-H; 1♂, Davies Ck, between Mareeba & Kuranda, 23.xii.1981, J. Kentwell; 1♂, Trinity Beach, N of Cairns, 2.xii.1986, MBM; 1♂, Trinity Beach, N of Cairns, 5.xi.1980, J. Olive; 3♂♂, 10 km N of Ellis Beach, 28,29.xii.1980, 9.i.1985, GAD; 1♂, Poly Ck, nr Garradunga, Innisfail, 15.i.1990, MBM; 1♂, Wernadanga Stn, SE of Burketown, 18.xii.1986, MBM; 1♂, 9 km WNW of Chillagoe, 17°08'S 144°26'E, 8.xii.1991, C.J. Burwell; 4♂♂, Chillagoe, 17°09'S 144°31'E, 8,10.xii.1991, C.J. Burwell; 1♂, 11 km WSW of Mt Surprise, 31.xii.1989, MBM; 2♂♂, 2♀♀, 24 km N of Einasleigh, 31.xii.1989, MBM; 1♂, Gilbert River, W Georgetown, 4.ii.03, J. Hasenpusch; 2♂♂, Black River, nr Townsville, 4.xii.1992, T. Woodger; 1♂, 1♀, Townsville, 27.xi.1986, MBM; 3♂♂, Townsville, 18.i.1991, 27.xi.1992, 22.xii.1993, M.F. Braby; 1♀, Upper Ross [River], Thuringowa, [Townsville], 19.xii.1991, L.R. Ring; 1♂, St Margarets Ck, approx. 20 mi S of Townsville, 1.ii.1973, AMW-H; 4♂♂ (1 male genitalic preparation no. AB58), 1♀ 60 km SSW of Townsville, 2.ii.1981, MBM; 1♀, Cape R., 100 km S of Charters Towers, 21.xii.1983, MBM; 4♂♂, 1♀, Bowen, 9.xii.1990, MBM; 2♂♂, 45 km S of Collinsville, 16.i.1987, MBM; 1♀, Grassy Gully, approx. 20 km N of Proserpine, 18.i.1975, AMW-H; 4♂♂, Shute Harbour nr Proserpine, 30.xii.1976, D. Lane; 1♂, Airlie Beach, Conway Rge, near Proserpine, 16.i.1984, R. Wood; 1♀, Bloomsbury, S of Proserpine, 9.xii.1980, MBM; 1♂, Mt Charlton, NW of Mackay, 19.i.1978, A. Hiller; 1♀, Landing Ck, Seaforth N of Mackay, 12.i.1986, E.E. Adams; 5♂♂, 5♀♀, Nindavale, Mackay, 25.xii.1984, E.E. Adams; 1♂, Gargett, W of Mackay, 14.i.1979, L.R. Ring; 7♂♂, 1♀, Balnagowan, W of Mackay, 24.xii.1984, E.E. Adams; 3♂♂ (1 male genitalic preparation no. AB61), 2♀♀, Ilbilie Hsd, S of Mackay, 27.xii.1984, E.E. Adams; 1♂, Rockhampton, 23.i.1973, A. Atkins; 1♂, Rockhampton, 26.i.1975, G.R. Brown; all in **MSM**. 9♂♂, 6♀♀, Station Creek, Coen, 4.i.1959, L. W[assell], Collection A.N. Burns [2♀♀ incorrectly labelled *A. willsi*]; 1♂, Port Stewart, Cape York [Peninsula], ii.1956, L. Wassell, Collection A.N. Burns; 1♂, Nesbitt Rr, Coen, 17.xi.1958, L. Wassell, Collection A.N. Burns; 1♂, Massy Creek, Silver Plains, east coast Cape York Pen. 8.vii.1960, J.L. Wassell, Collection A.N. Burns; 2♂♂, 1♀, Silver Plains, Coen, 11.i.1959, L. W[assell], Collection A.N. Burns [1 male incorrectly labelled *A. willsi*]; 1♂, Mareeba, 31.xii.1950, G. B[rooks], Collection A.N. Burns; 1♂, Kuranda, i.1950, R.W. Armitage; 1♂, Double Is, 19.xii.1926, A.B., Collection A.N. Burns; 1♂, 1♀, Mowbray R, 25.i.1953, G. B[rooks]; Collection A.N. Burns; 1♂, 1♀, Cairns, 6.i.1951, 1.i.1953, G. B[rooks], Collection A.N. Burns; 1♂, Woree, 12.i.1926, C. Borch; 1♀, Hambleton, 12.ii.1956, G. B[rooks], Collection A.N. Burns; 1♂, Meringa, 16.i.1925, A.N. Burns, Collection A.N. Burns; 1♂, Gordonvale, 15.i.1926, C. Borch; 2♀♀, Gordonvale, i.1930, Edmund Jarvis Coll. [incorrectly labelled *A. willsi*]; 1♂, Alooomba, 5.i.1926, C. Borch; 1♀, Dunk Is., 31.xii.1949–5.i.1950, G. B[rooks], Collection A.N. Burns; all in **MV**. 3♂♂, Bowen, 1917, E.H. Rainford; 1♂, R'hampton [=Rockhampton], 1937, S.R. Brock; 1♀, Nindavale, Mackay, 25.xii.1984, E.E. Adams; all in **QM**. 9♂♂, 17♀♀, Flinders I., i.1927, Hale & Tindale; 1♂, Townsville, xii.1903, F.P. Dodd; 1♂, 1♀, Bowen, 1917, E.H. Rainford; all in **SAM**. 3♂♂, West Claudie River, 4.5 km SW road junction, 12°44'S 143°15'E, 3,5.xii.1986, G. Daniels M. Schneider; 1♂, Meringa, 1.i.1947, J. Losser; 1♂, Meringa, 4.i.1926, C.B.; 1♂, Mackay, ii.1964, J.E. Dunwoody; all in **UQIC**.

Other material examined. QUEENSLAND—1♀, K56227, Almaden, Chillagoe Dist., iv.1927, W.D. Campbell; 1♀, K66716, Saddleback Is., off Pt. Denison, xii.1932, F.A. McNeill; all in **AM**. 1♀, Pine Ck, 21.i.1962, Carne & Britton; 1♂, Station Creek, Coen, 4.i.1959, L.

W[assell]; 2♀♀, Endeavour River, W.W. Froggatt Collection; 1♀, Pt Douglas, 17.i.1962, Carne & Britton; 1♀, Annan River, Cooktown, 1965, Brown; 1♂, Cairns, Jarvis, W.W. Froggatt Collection; 1♂, Cairns, i.190[?], *Abricta willsi*, Dist. W.W. Froggatt Collection; 1♂, Deeral, 19[?], J.F. Illingworth Coll., *Abricta kurandae*, Cairns, Coll. & det. W.W. Froggatt; 2♂♂, Palm Island, M.J. Mackerras; all in **ANIC**. 1♂, B.M. 1907-54, F.P. Dodd (no other data), **BMNH**. 1♀, Rifle Creek, Mt Molloy, 9.i.1992, L.R. Ring (teneral); 1♂, 18 km W of Hells Gate roadhouse [W of Burketown], 20.xii.1991, MBM; both in **MSM**. 1♂, Claudie R., ii.1914, Dr Macgillivray; 2♂♂, Cairns, 17, J.F. Illingworth Collection; 1♂, Cairns dist, A.M. Lea, incorrectly labelled *Abricta castanea*; 2♂♂, Meringa, 2.i.1926, A.N. Burns, Collection A.N. Burns; 1♂, Meringa, C. Borch; 2♂♂, Gordonvale, 15.i.1926, C. Borch; 2♂♂, Gordonvale, 22.i.1919, E. Jarvis; 1♀, Gordonvale, i.1930, Edmund Jarvis Coll. [incorrectly labelled *A. willsi*]; 1♀, Mackay, H.W. Brown; all in **MV**. 1♂, Cairns, J.F. Illingworth; 1♀, Deeral, J.F. Illingworth [incorrectly det. as *Tibicen kurandae*], both in **MSM**. 2♀♀, Greta Ck, 20 mi N of Proserpine, 1.i.1965, G. Monteith, both in **UQIC**. 5♂♂, 26♀♀, Flinders I., i.1927, Hale & Tindale (2♂♂, 2♀♀ incorrectly labelled *Abricta willsi*); 1♂, 1♀, Stanley I., Flinders I. [Group], i.1927, Hale & Tindale; 5♂♂, 2♀♀, Cairns dist., A.M. Lea (1♀ incorrectly labelled *Abricta willsi*, 1♂ incorrectly labelled both *Abricta castanea* and *Abricta willsi*); 1♂, Deeral, J.F. Illingworth (incorrectly labelled *Tibicen kurandae*); all in **SAM**.

Etymology. Named in honour of Alex Burns who wrote a number of papers on Australian cicadas and once intended to revise the genus *Abricta*.

Description

Male (Figs. 22, 58a,e, 98, 99). *Head*. Ferruginous and black in variable proportions; always black below and adjacent to ocelli and eyes; postclypeus, anteclypeus and most anterior part of head between eyes and postclypeus always brown. Rostrum ferruginous becoming black apically; reaching beyond bases of hind coxae but not extending to their apices. Eyes of live specimens blood red, variable in intensity. Antennae usually black but sometimes tending brown; basal segment always brown. Usually without obvious silver pubescence above but nearly always present below, principally on maxillary plates. *Thorax*. Pronotum ochraceous with a broad light to dark ferruginous or black middorsal fascia, this fascia spreading laterally both at its anterior end against pronotal margin as far as eyes, and at its posterior end against pronotal collar where it is always pale, or partly so (this pale area clear under magnification); pronotal collar black and ferruginous to varying degrees but always ochraceous laterally anterior of lateral angles. Mesonotum ferruginous and nearly always with a diffuse black blotch immediately anterior of cruciform elevation and along lower lateral margin above wing bases; sometimes with a pair of middorsal obconical markings distinguishable, their bases on anterior margin; cruciform elevation light brown. Thorax above usually without silver pubescence. Thorax below a mixture of ferruginous and black and always with fine silver pubescence. *Wings*. Hyaline. Fore wings usually with distinct infuscations at apex of apical cell 1, the base of apical cell 2 and the basal cross veins of apical cell 3; the degree of infuscation variable from bold, which often fills much of apical cell 1, to substantially reduced and limited to just the basal cross veins of cells 2 and 3 and apex of cell 1, and in rare extreme case completely lacking; venation brown, sometimes nearly black, costa ochraceous; basal cell weakly tinted translucent amber; basal membrane orange; costa and veins on basal third or so occasionally bearing some silver pubescence not visible to naked eye. Hind wings with a distinct

infuscation at distal end of vein 2A which sometimes extends partially around margin of anal lobe no further than 3A; sometimes also infuscated on basal half of anal lobe especially in plagal region, otherwise anal lobe weakly tinted translucent amber clearest on basal half; plaga off white, often contaminated by black; venation brown. *Legs*. Medium to light brown; without markings. *Opercula*. Muddy yellow to light orange brown, sometimes with black at extreme base and along lateral margin; clearly separated exposing apex of sternite I and barely concealing tympanal cavities; usually covered by silver pubescence not always obvious to naked eye. *Abdomen*. Tergite 1 black; tergites 2–7 light orange brown to ferruginous with a black anterior margin that is broadest across dorsal region; tergites 3–7 also usually with a very narrow pale yellowish posterior margin; tergite 8 black on basal half or so, remainder orange brown. Sternites medium to light brown, often with posterior margins of III–VI with a narrow pale yellow posterior margin. Abdomen above and below often with silver pubescence not always obvious to naked eye. *Tymbals* (Fig. 22). Usually 10–11 long tymbal ribs, otherwise as for generic description. *Genitalia* (Figs. 98, 99). Pygofer orange brown to ferruginous tending dark around upper pygofer lobes, yellowish at outer basal lobe; upper pygofer lobes in lateral view broad, upper margin distinctly curved outwards in central region, lower margin straight, distal end curved upwards towards an upturned pointed apex, in ventral view angled slightly inwards; basal lobes with a broad webbing fusing much of outer and inner lobes, in lateral view outer lobe just a short finger-like projection beyond webbing. Uncal lobes scoop-like and gently upturned at their distal ends; lateral processes of uncus in lateral view nearly equal in length to upper pygofer lobes, angled slightly upwards from near base and bluntly terminated. Conjunctival claws simple, sharply pointed, directed laterally. Flabellum present ventrally, produced on either side into a rounded lobe. Paleris absent.

Female (Figs. 9, 58b–d). Colour and markings similar to male. Abdominal segment 9 ferruginous brown paling ventrally. Ovipositor sheath black and clearly extending beyond dorsal beak.

Measurements. $n = 10\text{♂♂}$, 10♀♀ (includes smallest and largest of available specimens). *Length of body*: male 14.8–18.1 (16.7); female 18.1–22.5 (19.7). *Length of fore wing*: male 20.1–25.0 (22.8); female 22.7–27.4 (24.7). *Width of head*: male 5.5–6.5 (6.1); female 6.0–6.8 (6.3). *Width of pronotum*: male 5.7–7.0 (6.4); female 6.2–7.2 (6.7).

Distinguishing features. The exceptional variation in fore wing infuscations, and the close similarity of this species with others, calls for care in identification. Some individuals of *T. burnsi* are almost indistinguishable from some individuals of *castanea*; however the distributions of these two species are quite distinct (ignoring the doubtful record from near Burketown) and specimens of known origin are easily determined. There are also clear differences in male genitalia, primarily in the shapes of the upper and lower pygofer lobes.

Confusion of *burnsi* with *T. kauma* is also a possibility although their distributions probably do not overlap. Where doubt of identity exists male genitalia should be examined; the conjunctival claws in ventral view are strongly recurved in *kauma* while the flabellum of *burnsi* is clearly separated into a pair of lateral lobes.

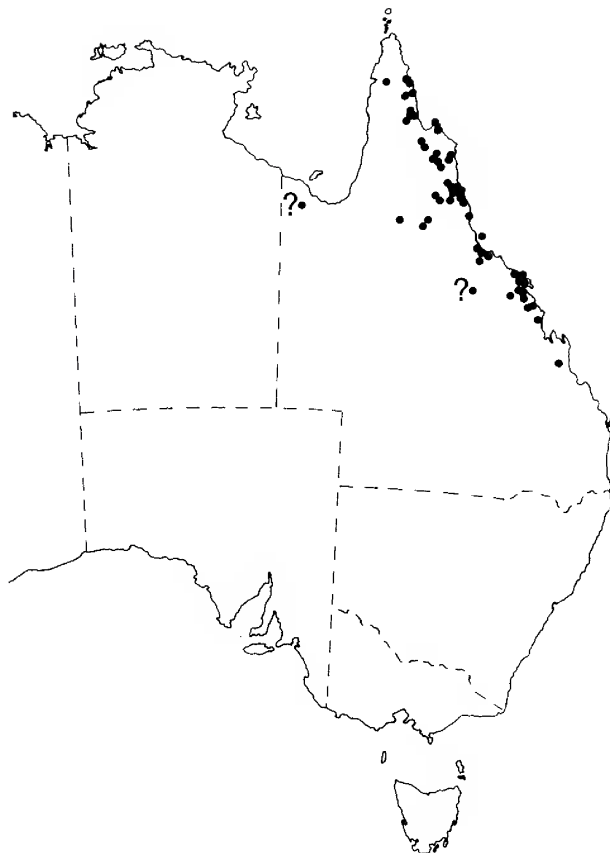


Fig. 76. Known distribution of *Tryella burnsi* n.sp. Localities bearing a question mark require confirmation (see text).

Atypical specimens of *burnsi* without fore wing infuscations could be mistaken for *T. ochra* but the presence of a large black blotch anterior of cruciform elevation in *burnsi* clearly separates specimens of *burnsi* from those of *ochra* which are pale immediately anterior of cruciform elevation or evenly coloured.

Distribution (Fig. 76). Tropical and subtropical Queensland south from Weipa and Iron Range to Rockhampton. Nearly all records are from along the east coast with a small number of inland records extending west as far as the Gilbert River and possibly to the Cape River. A single male taken west of Burketown appears to be this species but in view of its isolation is treated as doubtful until further specimens are obtained to confirm its identity. Likewise, the Cape River record is based upon a single female, the identity of which also requires confirmation.

Usually populations tend to be small but occasionally the species is locally common. Adults have been taken from October to early February, with single records for April and July. They are most abundant during December. This species may be sympatric with *willsi*. The known distributions of these two species are, for the most part, allopatric but they may be possibly sympatric in coastal districts between Mackay and Rockhampton although all known records for the two species in this region are separated by the Connors Range, *willsi* occurring only to the west and *burnsi* only to the east.

Habitat. Probably eucalypt trees and saplings, where adults favour the smaller branches.

Tryella castanea (Distant, 1905), n.comb.

Figs. 10, 54a–e, 77, 83, 84

Abricta castanea Distant, 1905a: 27; Distant, 1906: 131; Kirkaldy, 1907a: 16; Ashton, 1914: 349; Kato, 1932: 181; Burns, 1957: 635; Metcalf, 1963: 206; Duffels & van der Laan, 1985: 234; Moulds, 1990: 122–123; Ewart, 1993: 139.

Types. Syntype series of 5 ♂♂, 1 ♀, (all BMNH) (examined). 1 ♂ bearing three labels: (a) “*Abricta/castanea*/Dist./type” handwritten in black ink, probably original Distant label; (b) small white circular label with red border on which is machine printed “Type”; (c) small white circular label with blue border on which is machine printed “SYN-/TYPE”. 4 ♂♂, 1 ♀ each bearing two labels: (a) a pale blue circular label on which is handwritten in black ink “North/Austr”; (b) small white circular label with blue border on which is machine printed “SYN-/TYPE”.

Distant (1905a) did not designate a holotype or state the number of specimens examined. He did, however, indicate in his description that he had several specimens and gave a range for male body length. All six specimens in BMNH listed above that are believed to be syntypes are considered conspecific.

Type locality. Distant (1905a) gave the type locality simply as “North Australia” and the collector as “J.R. Elsey”. The description of *castanea* states “tegmina unspotted” and indeed the type series totally lacks fore wing infuscations except for one male with some very limited infuscation. Specimens consistently lacking fore wing infuscations, or occasionally with very limited infuscation, are known only from the Victoria River, Northern Territory, especially from the vicinity of Timber Creek township (see comments below). These also tend to be smaller than specimens from elsewhere and the syntype series clearly falls within this smaller size range. Further, Distant (1905b) described *Abricta elseyi* from the Victoria River, from material taken by Dr J.R. Elsey during the Gregory Exploration Expedition, British Museum. As J.R. Elsey is also stated to be the collector of the type series of *castanea* it is reasonable to conclude that the type locality of this species is also the Victoria River.

Material examined. WESTERN AUSTRALIA—1 ♂, K179957, 1 ♀, K179956, Fitzroy & Margaret Rs, 1896, Calvert Exped., H. Ashton Coll.; 1 ♂, K179847, Wyndham, 31.xii.1991, MBM; 1 ♀, K179848, Kununurra, 7.i.1986, MBM; all in AM. 1 ♂, Wyndham-K.R.S. [Kimberley Research Station], 15.x.1953, R. Lukins; 1 ♂ (genitalic preparation no. AB101), Forrest R. Mission, 7.i.1954, R. Lukins; 1 ♂, 1 ♀, Wyndham, 27.i.29.iii.25.iv.1930, T.G. Campbell; 2 ♂♂, 1 ♀, Wyndham, 26.xii.1930, 5.xii.1930–8.i.1931, H.J. Willings; 4 ♂♂ (1 male genitalic preparation no. AB90), 1 ♀, Ascot Station, Wyndham, 14.i.1930, T.G. Campbell; all in ANIC. 1 ♀, Tunnel Creek, E of Derby, 1.xi.1978, MBM; 1 ♂, 16 km NW of Fitzroy Crossing, 1.i.1986, MBM; 10 ♂♂, 1 ♀, 50 km SSE of Fitzroy Crossing, 1.i.1986, MBM; 3 ♂♂ (two male genitalic preparations Nos AB17, AB70), 1 ♀, 80 km SW of Halls Creek township, 2.i.1986, MBM; 2 ♂♂ (one male genitalic preparation no. AB63), Halls Creek township, 2.i.1986, MBM; 2 ♂♂, 2 ♀♀, 11 km S of Turkey Creek township, 3.i.1986, MBM; 1 ♂, Little McPhees Ck, 150 km S of Wyndham, 3.i.1986, MBM; 1 ♂ (genitalic preparation no. AB95), Zebidae Springs, El Questro Stn, E Kimberley, 28.xii.1991, MBM; 5 ♂♂, 3 ♀♀, Wyndham, 4.i.1986, 31.xii.1991, MBM; 1 ♂, 20 km W of Ord River, Duncan Hwy, 3.i.1986, MBM; 3 ♂♂ (one male genitalic preparation no. AB64), 3 ♀♀, Kununurra, 7.i.1986, MBM; 2 ♂♂ (one male genitalic preparation no. AB75), 1 ♀, Kununurra, 28.i.1987, E.A. Henty; all in MSM. 9 ♂♂, 2 ♀♀, Forrest R. Mission, ii.1954, 6.9.i.54, K.J.C., Collection A.N. Burns; 1 ♂, Kimberley Res Stn, Wyndham, 10.xii.1915, G. Lukins, Collection A.N. Burns; 1 ♀, Wyndham, 23.xii.1953, R. Lukins, Collection A.N. Burns; all in

MV. 1 ♂, Calvert Exped., 1896, Fitzroy & Margaret Rs. (no other data), in SAM. NORTHERN TERRITORY—1 ♂, K179849, 1 ♀, K179850, Victoria Hwy, Dingo Ck, nr W.A. border, 1.i.1992, MBM; 1 ♂, K179852, 1 ♀, K179851, Victoria R. 18 km W of Timber Creek township, 25.xii.1991, MBM; 2 ♂♂, K179947 and K179950, 2 ♀♀, K179948 and K179949, Zimmin Rd, Katherine, 6.17.xii.1996, ex Citrus limon, M. Houtt; 1 ♀, K179951, 20 mi NE Oenpelli, x.1970, W. Omer-Cooper; 4 ♂♂, K179952–K179955, Wa Wee Billabong area, 8.10.11.x.1970, W. Omer-Cooper; all in AM. 1 ♀, 30 mi[les] SE of Adelaide River (town), 1.xi.1966, A. & R. Mesa; 6 ♀♀, Tindal, 14°31'S 132°22'E, 1–20.xii.1967, light trap, W.J.M. Vestjens; 2 ♂♂, 3 ♀♀, Katherine, 27.xi.1967, W.J.M. Vestjens; 1 ♂, 16°18'S 133°26'E, 9 km SSE of Daly Waters, 11.xi.1979, T. Weir; 1 ♀, Tennant Creek, 1906, Field, W.W. Froggatt Collection; all in ANIC. 14 ♂♂ (one male genitalic preparation no. AB97), 14 ♀♀, Victoria Hwy, Dingo Ck, nr W.A. border, 1.i.1992, MBM; 6 ♂♂ (one male genitalic preparation no. AB69), 2 ♀♀, junct Victoria & Duncan Hwy, E of Kununurra, 6.i.1986, MBM; 1 ♂, Victoria Hwy, 110 km E of Kununurra, 26.xii.1991, MBM; 1 ♂, Alpha Ck, 35 km W of Timber Creek township, 8.i.1986, MBM; 35 ♂♂ (2 ♂♂ genitalic preparations Nos AB96, AB99), 18 ♀♀ Victoria R. 18 km W of Timber Creek township, 25.xii.1991, MBM; 2 ♂♂ (male genitalic preparations Nos AB13, AB68), 1 ♀, 40 km E of Timber Creek, Victoria Hwy, 8.i.1986; 22 ♂♂ (one male genitalic preparation no. AB98), 22 ♀♀, Victoria Hwy, 10 km E of Victoria R. Inn, at river x-ing, 2.i.1992, MBM; 1 ♀, Dashwood x-ing, Victoria R., nr Victoria R. Downs, 24.xii.1991, MBM; 2 ♂♂ (one male genitalic preparation no. AB62), 6 ♀♀, Springvale Stn, 12 km W of Katherine, 8.xii.1982, A. Walford-Huggins; 42 ♂♂ (2 male genitalic preparations Nos AB14, AB15), 44 ♀♀, Waterhouse River, Mataranka Hsd, 9.i.1986, 23.24.25.xii.1986, MBM; 3 ♂♂, 6 ♀♀ 38 km N of Daly Waters, Stuart Hwy, 23.xii.1986, MBM; 1 ♂, 1 ♀, 32 km N of Daly Waters, Stuart Hwy, 23.xii.1986, MBM; 1 ♂, 25 km N of Daly Waters, 23.xii.1986, MBM; 2 ♀♀, 10 km N of Daly Waters, 8.xii.1982, A. Walford-Huggins; 1 ♂, 11 km N of Dunmarra, Stuart Hwy, 23.xii.1986, MBM; 1 ♂, Elliott, 7.xii.1982, A. Walford-Huggins; 12 ♂♂ (one male genitalic preparation no. AB16), 7 ♀♀, Tennant Creek township, 23.i.1977, 22.i.1984, MBM; 1 ♂, Borroloola, 22.xii.1991, MBM; 1 ♂ (genitalic preparation no. AB72), 70 km S of junction Carpentaria/Tablelands Hwys, 12.i.1986, MBM; all in MSM. 2 ♀♀, Katherine, xii.1957, J. Wren, Collection A.N. Burns; 3 ♀♀, Katherine, xii.1959, B.W. Wren, Collection A.N. Burns, (1 labelled holotype, 2 labelled paratypes of *A. tacomona*, an unpublished manuscript name); all in MV. 1 ♀, Daly R., (no date), H. Wesselman; 3 ♂♂, 2 ♀♀, Tennant's Ck., (no date), J.F. Field (1 ♂, 1 ♀, incorrectly labelled *Abricta willisi*); all in SAM. 1 ♀, Auvergne Stn, 4.xii.1965, J. Edey, in QJIC. QUEENSLAND—1 ♂, Escott Stn, W of Burketown, 17°44'S 139°25'E, 19.xii.1991, MBM, in MSM.

Description

Male (Figs. 54a,c, 83, 84). *Head.* Usually black and ferruginous in variable proportions with the black dominant, but some individuals entirely brown or almost so; antennal plate nearly always partly or entirely ferruginous; postclypeus and anteclypeus ferruginous. Rostrum ferruginous becoming black apically, reaching to about bases of hind coxae. Eyes of live specimens (Victoria River, NT) initially light grey becoming dark grey and finally black with maturity. Antennae usually black but sometimes tending brown; basal segment always brown and usually also part of second segment. Without obvious silver pubescence above but usually distinct below except on clypeus. *Thorax.* Pronotum ochraceous with a broad pale to very dark ferruginous fascia on midline, this fascia spreading laterally both at its anterior end against pronotal margin to eyes or sometimes beyond, and at its posterior end against pronotal collar; on some individuals the inner portion of this middorsal fascia is very pale so that the fascia appears in outline only while on some other individuals the expansion against the pronotal collar is paler than remainder; pronotal collar either entirely black, entirely ferruginous, or a mixture of both. Mesonotum light to dark ferruginous, sometimes with a pair of middorsal

obconical markings based on anterior margin partially or totally defined; cruciform elevation often light brown but always darkened to varying degrees in dark specimens. Thorax above usually without noticeable silver pubescence. Thorax below medium to light brown and always with fine silver pubescence. *Wings*. Hyaline. Fore wings either without infuscations or with infuscations confined to bases of apical cell 2 and the basal cross vein of apical cell 3, usually infuscation is confined to the cross veins of both cells only but sometimes the infuscation joins along Rs; venation brown, sometimes black basally, costa ochraceous; basal cell weakly tinted translucent amber; basal membrane orange; costa and veins on basal third or so occasionally bearing some silver pubescence not visible to naked eye. Hind wings with a distinct infuscation at distal end of vein 2A which sometimes extends partially around margin of anal lobe no further than 3A, and sometimes overlaying off white plaga; venation brown. *Legs*. Medium to light brown; without markings. *Opercula*. Muddy yellow suffused black to varying degrees between individuals, sometimes nearly black; usually covered by silver pubescence not always obvious to naked eye; clearly separated exposing apex of sternite I and barely concealing tympanal cavities. *Abdomen*. Tergites medium to dark ferruginous, sometimes nearly black, with little tonal variation within individuals although there is a tendency on some specimens for posterior half of each segment to be slightly paler. Sternites somewhat similar in colour but tending on some specimens to be pale on posterior half of sternites III–VI. Abdomen above and below often with silver pubescence not always visible to naked eye. *Tymbals*. Usually 10 long tymbal ribs, smaller specimens often with 9, otherwise as for generic description. *Genitalia* (Figs. 83, 84). Pygofer dark ferruginous; upper pygofer lobes in lateral view very broad at base tapering to a narrow rounded apex, in ventral view nearly straight and usually tilted slightly inwards; basal lobes without webbing fusing inner secondary lobes and outer lobes, outer lobes in lateral view like a very long thin finger, gently curved, nearly equal in length to upper pygofer lobes. Uncal lobes scoop-like and gently upturned at their distal ends; lateral processes of uncus in lateral view nearly equal in length to upper pygofer lobes, often slightly curved downwards and broadly rounded at apex. Conjunctival claws directed laterally, the distal end of each bearing three sharply-pointed teeth, the central tooth longest. Flabellum absent. Palearis absent. Usually ventral surface of theca with small raised transverse ridges widely spaced.

Female (Figs. 10, 54b,d,e). Colour and markings similar to male. Abdominal segment 9 light to very dark ferruginous; dorsal beak usually black or blackish. Ovipositor sheath black and clearly extending beyond dorsal beak.

Measurements. 10 km E of Victoria River Inn, NT: n = 10♂♂, 10♀♀ (includes smallest and largest of available specimens). *Length of body*: male 11.3–15.3 (13.6); female 13.5–17.0 (15.0). *Length of fore wing*: male 16.8–20.0 (18.5); female 18.4–21.6 (20.0). *Width of head*: male 4.4–5.8 (5.1); female 4.8–6.0 (5.4). *Width of pronotum*: male 4.4–5.5 (5.0); female 4.8–6.3 (5.5). MATARANKA HOMESTEAD, NT: n = 10♂♂, 10♀♀ (includes smallest and largest of available specimens). *Length of body*: male 14.6–17.3 (16.0); female 15.4–18.7 (17.4). *Length of fore wing*: male

19.1–22.5 (21.2); female 20.5–23.8 (22.4). *Width of head*: male 5.1–5.9 (5.5); female 5.3–6.0 (5.9). *Width of pronotum*: male 5.1–6.2 (5.7); female 5.5–6.5 (6.2). TENNANT CREEK TOWNSHIP, NT: n = 10♂♂, 8♀♀ (includes smallest and largest of available specimens). *Length of body*: male 17.4–19.3 (18.2); female 20.1–21.0 (20.7). *Length of fore wing*: male 22.9–25.2 (24.1); female 25.5–27.3 (26.3). *Width of head*: male 6.2–6.7 (6.4); female 6.7–7.0 (6.8). *Width of pronotum*: male 6.6–7.4 (6.9); female 7.4–7.8 (7.6).

Adult variability. There are marked size differences both within and between populations with those from lower rainfall regions usually smaller than those from areas of high rainfall and lush vegetation. Specimens from the Victoria River catchment are characteristically small (compare measurements above). Typical of the majority of localities are those from Mataranka Homestead (with a fore wing length from 19–24 mm). The specimens from Tennant Creek are possibly abnormally large as they were taken from lush eucalypts in watered parkland.

Tryella castanea is the most variable of all *Tryella* species, not only in size (see above) but also in colour and fore wing infuscations. Colour differences may be partially due to aging with darker individuals being older. The presence of fore wing infuscations is characteristic for most localities throughout the species' range although there is some variability, but never is infuscation exceptionally bold with confinement to the base of apical cells 2 and 3 and nearly always to the cross veins only; a lack of fore wing infuscation is typical only for specimens from near the Victoria River (near Timber Creek township and Victoria River Inn) although a small percentage (approximately 10%, n=102) do show weak infuscations.

Electrophoretic examination of populations from Wyndham in Western Australia, Dingo Creek, Timber Creek and Victoria River Inn in Northern Territory and Escott Station in Queensland that displayed considerable differences in size, colour and wing infuscation, confirmed all were conspecific (Serkowski & Moulds, unpub. data); all possess male genital structures typical of *castanea*. Further, the population from Timber Creek which included individuals with either black or grey eyes were clearly shown to be homogeneous.

Distinguishing features. The exceptional variability of this species calls for care in identification. Within the geographic range of *castanea* the most similar species is *T. adela*. However, where the two are sympatric (central and eastern part of monsoonal Northern Territory), only small atypical specimens of *castanea* are likely to be confused with *adela*. Typical specimens of *castanea* differ not only in their normally larger size (fore wing rarely below 22 mm), but also by having the basal cell pigmented and the antennal plate nearly always brown rather than black (visible under magnification); male genital structures show clear differences between *castanea* and *adela* and should be examined in doubtful cases. For the most part, however, *castanea* is not sympatric with *adela* and geographic location usually provides an excellent guide to identity. Some individuals of *T. castanea* are almost indistinguishable from some individuals of *T. burnsi* (except for male genitalia); however, the distributions of these two species are quite distinct (ignoring a doubtful record from near Burketown) and specimens of known origins are easily determined.

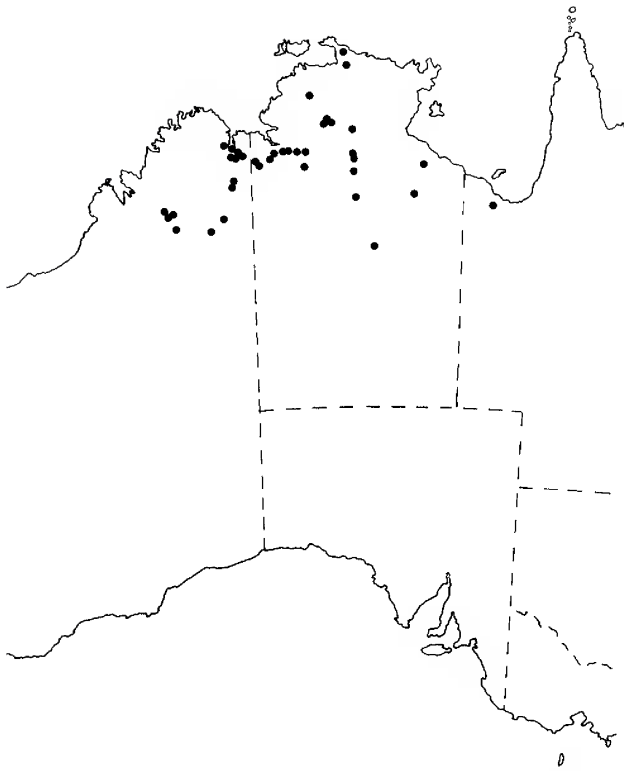


Fig. 77. Known distribution of *Tryella castanea* (Distant).

Distribution (Fig. 77). Kimberley region of Western Australia, northern half of Northern Territory where records are concentrated on the Victoria River region and along the Stuart Highway between Adelaide River and Tennant Creek with additional isolated records from western Arnhem Land, 70 km south of junction of Carpentaria/Tablelands Highways and Borroloola, and from far northwestern Queensland near Burketown. Records are lacking from the interior of the Kimberley region, the Tanami Desert and much of Arnhem Land but these absences almost certainly reflect a lack of collecting rather than a true absence from these areas.

Adult emergence is probably dependent upon wet season rains. There are records from October to late April.

The distribution for this species given by Moulds (1990) includes records of other *Tryella* species unrecognized at the time as distinct from *T. castanea*.

Habitat. Adults appear to favour small branches amongst tree foliage.

Song. Singing occurs both during the day and at dusk although the dusk song is usually by far most vigorous and sustained. An analysis of the song is under study (Moulds, in prep.).

Biology. Adults emerge after dark and are capable of flight even before their wings harden. They are pale straw coloured on emergence but show signs of their final pigmentation within 2 hours and are fully coloured and ready to sing by morning.

Severe damage to lemon trees, *Citrus limon*, in an orchard near Katherine, NT was caused by large numbers of adults ovipositing in semi-hardened flush growth (R. Dodd, pers. comm.).

Tryella crassa n.sp.

Figs. 23, 61a–e, 78, 81, 82

Types. Holotype ♂, K179830, 16 km E of Cloncurry, N Queensland, 19.i.1984, M.S. & B.J. Moulds; in AM. Paratypes as follows: NORTHERN TERRITORY—2♂♂, K179831 and K179833, 1♀, K179832, Kalkaringi, 17°26'54"S 130°50'05"E (gps), 10.i.2001, MBM; all in AM. 1♀, Kalkaringi, 17°26'54"S 130°50'05"E (gps), 10.i.2001, MBM, in BMNH. 16♂♂, 10♀♀, Kalkaringi, 17°26'54"S 130°50'05"E (GPS), 10.i.2001, MBM; 1♂, 123 km SW of Kalkaringi, 17°45'48"S 129°52'10"E (gps), 10.i.2001, MBM; 1♂ (genitalic preparation no. AB45), 80 km SW of Katherine, 6.ii.1977, MBM; 3♂♂ (one male genitalic preparation no. AB89), 2♀♀, Mataranka Hstd, 11.i.1992, MBM; all in MSM. QUEENSLAND—1♂, same data as holotype and allotype, ANIC. 1♂, same data as holotype and allotype, in BMNH. 8♂♂, 15 km E of Mt Surprise, 2.iii.1998, J. Olive and J. Thompson; all in JO. 6♂♂ (one male genitalic preparation no. AB46), 3♀♀, Lawn Hill Ck, Adels Grove, W of Gregory Downs, 19.xii.1986, 18.xii.1991, MBM; 2♂♂, 1♀, Normanton, 15.i.1986, MBM; 18♂♂ (one male genitalic preparation no. AB25); 4♀♀, same data as holotype; 6♂♂, 3♀♀, 20 km W of Cloncurry, 20.i.1984, MBM; 3♂♂, Selwyn Mine, 160 km SE of Mt Isa, 21.ii.1991, 26.i.1995, 30.i.1997, T. Woodger; 12♂♂, 3♀♀, 40 km W of Georgetown, 16.i.1992, MBM; 11♂♂ (one male genitalic preparation no. AB9), 4♀♀, Bruce Hwy, nr Salt Water Ck, 20 km S of Home Hill, 22.xii.1987, MBM; all in MSM. 1♂, 1♀, same data as holotype and allotype, both in QM.

Etymology. From the Latin *crassus* meaning thick, fat or stout and pertaining to the stocky build of this species.

Description

Male (Figs. 23, 61a,c, 81, 82). **Head.** Dark ferruginous usually partly tending black and usually a little darker than thorax, occasionally almost entirely black except for postclypeus; postclypeus always ferruginous brown and usually lighter in tone than thorax; anteclypeus ferruginous brown to nearly black but usually with midline entirely or partly of a lighter tone. Rostrum brown and black to varying degrees but usually brown basally becoming black towards apex and often with extreme apex brown; not quite reaching bases of hind coxae. Eyes of live specimens light grey with no distinct pseudopupil. Antennal plates well developed and when viewed from directly in front covers most of antennal segment 1. Antennae usually black but sometimes partly brown. Often bearing some silver pubescence most obvious below. **Thorax.** Pronotum dark reddish brown to dark ferruginous, usually unicolorous but on some individuals midline marginally darker or paler; pronotal collar usually a little darker than remainder, sometimes tending blackish. Mesonotum similar in colour to pronotum; virtually concolorous but some individuals with a very faint obconical marking each side of midline against anterior margin. Thorax above often bearing a little silver pubescence. Thorax below similar in colour to above and nearly always with an obvious covering of silver pubescence. **Wings.** Hyaline but usually with a faint brown suffusion. Fore wings infuscated at bases of apical cells 2 and 3, usually appearing as a continuous zigzag but sometimes as two spots confined to crossveins; some individuals also infuscated at apical cell 1 partly or entirely along length of vein R1b; venation brown, costa light yellowish brown; basal cell tinted brown, usually darker than tint on remainder of the wing; basal membrane light yellowish brown; lacking silver pubescence obvious to naked eye. Hind wings with a distinct infuscation at distal end of vein 2A which sometimes extends partially around margin of anal lobe; often a small infuscation near centre

of wing at base of apical cell 4; basal half or so of anal lobe weakly tinted brown similar to the tint of fore wing basal cell; plaga off-white; venation from light brownish yellow to brown. *Legs*. Dark reddish brown to dark ferruginous, similar in tone to that of thorax; without noticeable markings. *Opercula*. Pale muddy yellow to dark brown tending black; often bearing some fine silver pubescence usually discernible to the naked eye; clearly separated exposing apex of sternite I and barely concealing tympanal cavities. *Abdomen*. Tergites dark reddish brown to dark ferruginous, similar in tone to that of thorax; tergite 8 usually with its posterior margin narrowly edged black at least across dorsal half. Sternites variable between individuals, sometimes entirely brown, sometimes with pale posterior margins and sometimes with black posterior margins, the distal half or so of sternite VII nearly always dark. Abdomen above and below often with some fine golden pubescence. *Tymbals* (Fig. 23). Usually 10 long tymbal ribs, otherwise as for generic description. *Genitalia* (Figs. 81, 82). Pygofer dark reddish brown to dark ferruginous; upper pygofer lobes in lateral view clearly subdivided with a large, broad, rounded basal section behind which continues an apical section that tapers to a blunt rounded point, in ventral view tilted slightly inwards with the subdivision of terminal sections clearly visible externally as a stepped profile; basal lobes without webbing fusing inner and outer lobes, outer lobe in lateral view like a very long thin finger, gently curved, nearly equal in length to upper pygofer lobe. Uncal lobes scoop-like and gently upturned at their distal ends; lateral processes of uncus in lateral view nearly equal in length to upper pygofer lobes, nearly straight, broadly rounded at apex. Conjunctival claws directed laterally, the distal end of each bearing three sharply-pointed teeth, the central tooth longest. Flabellum absent. Palearis absent.

Female (Figs. 61b,d,e). Colour and markings similar to male. Abdominal segment 9 similar in colour to abdomen and thorax; dorsal beak usually darker and sometimes black. Ovipositor sheath dark brown to black and clearly extending beyond dorsal beak.

Measurements. $n = 10\text{♂♂}$, 10♀♀ (includes smallest and largest of available specimens). *Length of body*: male 15.5–23.8 (19.9); female 17.7–24.8 (20.6). *Length of fore wing*: male 20.2–29.2 (24.7); female 21.6–30.5 (25.2). *Width of head*: male 5.1–7.3 (6.3); female 5.4–7.5 (6.5). *Width of pronotum*: male 6.0–8.8 (7.6); female 6.5–9.0 (7.8).

There are notable differences in size, both within and between populations. Of the limited material available those specimens taken near Cloncurry in January 1984 are largest and very much larger than specimens taken near Georgetown in January 1992. Specimens from Mataranka, Northern Territory, and near Home Hill, northeastern Queensland, are also smallish while those from Adels Grove, northwestern Queensland, are intermediate in size. Size, therefore, shows no geographic trend and is very likely a consequence of availability of nymphal food.

Distinguishing features. The uniform body colouration of this species, combined with its lightly tinted wings, makes confusion with any other *Tryella* species unlikely. It is most similar to *occidens*, *noctua* and some individuals of *stalker*, but none of these species occurs sympatrically with *crassa*. *Tryella crassa* is immediately distinguished from *occidens*,

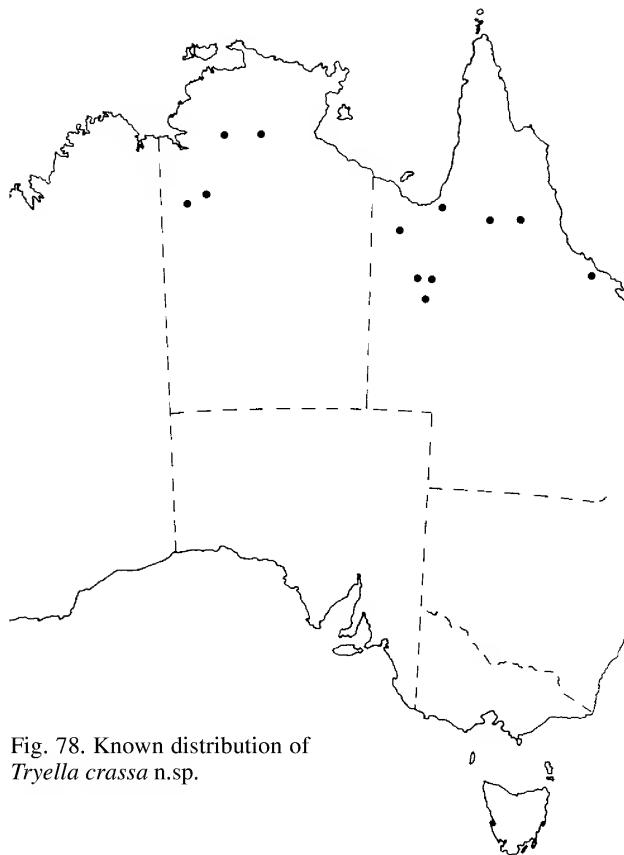


Fig. 78. Known distribution of *Tryella crassa* n.sp.

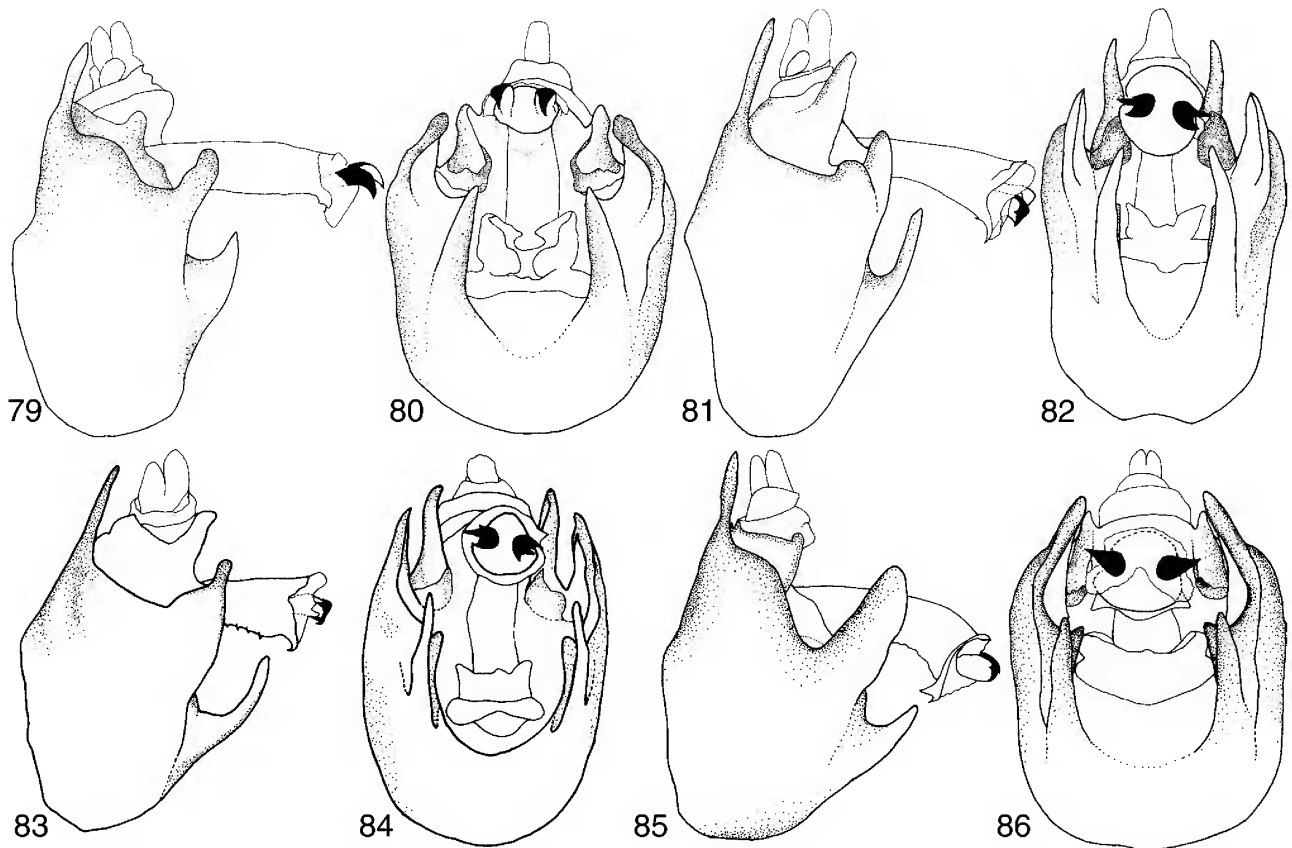
noctua and *stalker* by the lack of fore wing infuscation anywhere across the base of apical cell 4; the infuscation on *crassa* never passes beyond the base of apical cell 3.

Distribution (Fig. 78). Inland regions of monsoonal Northern Territory, where it is known from 80 km SW of Katherine, Mataranka Homestead and the headwaters of the Victoria River, and drier regions of monsoonal Queensland south of the Gulf of Carpentaria to Selwyn mine (160 km SE of Mt Isa) and east almost to Georgetown and far eastern Queensland at Salt Water Creek, 20 km south of Home Hill. Adults emerge after the first heavy summer rains and tend to be very local. There are records from mid December to late February.

Habitat. Adults appear to favour shrubs and low eucalypt saplings where they are usually found on the smaller branches or amongst foliage. However, the populations from 20 km south of Home Hill, Queensland, and from Kalkaringi, NT, were almost exclusively confined to grass in areas where there was a total or substantial absence of trees and shrubs. The species may in fact breed upon grass and males may seek higher advantage points when available from which to call.

Song. Singing occurs both during the day and at dusk. Day calling, however, may be restricted to overcast or partly overcast conditions as I have never heard singing on hot sunny days except at dusk. The dusk call is always vigorous. An analysis of the song is under study (Moulds, in prep.).

Biology. Mature nymphs are golden brown and glossy except for abdomen below; wing pads light yellowish brown; a dark brown area each side of midline on pronotum; brown patch each side of midline on abdominal segment 8; legs golden brown with fore leg claws dark brown; eyes grey.



Figs. 79–86. Male genitalia of *Tryella* species showing pygofer with uncus and aedeagus in right lateral view (left) and ventral view (right): (79–80) *T. rubra*, genitalia prep. AB53; (81–82) *T. crassa*, genitalia prep. AB9; (83–84) *T. castanea*, genitalia prep. AB15; (85–86) *T. adela*, genitalia prep. AB1.

***Tryella graminea* n.sp.**

Figs. 24, 57a,b, 87, 92, 93

Types. Holotype ♂, K179859, Torrens Creek township, 90 km E of Hughenden, N Queensland, 3.ii.1981, M.S. & B.J. Moulds, AM. Paratypes as follows: NORTHERN TERRITORY—3♂♂ (one genitalic preparation no. AB31), 3♀♀, Ayers Rock, 3.ii.1984, MBM; 1♀, Sixteen Mile Creek, N of Alice Springs, 29.i.1984, MBM; 2♂♂, 2♀♀, Burt Ck, 55 km N of Alice Springs, 24.i.1984, MBM; 5♂♂, 1♀, 5 km S of Taylor Ck, 47 km NE of Barrow Creek township, 23.i.1984, MBM; 1♂, Tennant Creek township, 22.i.1984, MBM; 4♂♂, 10 km W of Soudan Hsd, 21.i.1984, MBM; 4♂♂, 25 km NW of Avon Downs Hsd, 21.i.1984, MBM; all in MSM. QUEENSLAND—2♂♂, K179860 and K179861, 2♀♀, K179862 and K179863, Mt Isa, 20.i.1984, MBM; all in AM. 2♂♂, 2♀♀, Mt Isa, 20.i.1984, MBM; all in BMNH. 3♂♂, 1♀, 85 km SSW of Burketown, 19.xii.1986, MBM; 1♀, “Gregory Downs”, S of Burketown, 6.xii.1982, A. Walford-Huggins; 5♂♂ (one genitalic preparation no. AB11), Delta Downs Stn., E of Karumba, 16.xii.1987, MBM; 4♂♂ (one genitalic preparation no. AB106), 3♀♀, vicinity Lawn Hill Creek, Lawn Hill NP, 31.x.1996, K.A. Kopestonsky; 8♂♂ (one genitalic preparation no. AB32), 4♀♀, nr Thornton Hsd, 120 km ENE of Camooweal, 21.xii.1986, MBM; 2♂♂, 80 km NW of Mt Isa, 20.i.1984, MBM; 26♂♂ (one genitalic preparation no. AB30), 18♀♀, Mt Isa, 20.i.1984, MBM; 54♂♂, 31♀♀, Selwyn mine, 160 km SE of Mt Isa, 1,6,7,16,17,23.ii.1995, 13.iii.1995, T. Woodger; 9♂♂ (one genitalic preparation no. AB33), Malbon, 50 km SSW of Cloncurry, 14.iii.1991, T. Woodger; 1♂, 45 km E of Cloncurry, 5.i.1987, MBM; 5♂♂, 2♀♀, 50 km E of Cloncurry, 19.i.1984, MBM; 1♂, 10 km W of Torrens Creek township, E of Hughenden, 7.i.1987, MBM; 49♂♂ (one genitalic preparation no. AB29), 15♀♀, Torrens Creek township, 90 km E of Hughenden, 3.ii.1981, 18.i.1984, MBM; 14♂♂, 1♀, Noonbah Hsd, SW of Longreach, 24°07'S 143°11'E, 25.26.i.1998, 4,9.ii.1998, A. Emmott; 12♂♂, 4♀♀, Alpha, 10.ii.1981, MBM; 1♂, Warrego River, 15 km NNE of Charleville, ii.1994, C. Dollery; all in MSM. 2♂♂, 2♀♀, Mt Isa, 20.i.1984, MBM; all in QM.

Other material examined. SOUTH AUSTRALIA—1♂, Oodnadatta [no other data] (SAM).

Etymology. From the Latin *graminis* meaning grass and referring to the habitat of the species.

Description

Male (Figs. 24, 57a, 92, 93). *Head.* Black; postclypeus ferruginous, often black or tending so around perimeter; anteclypeus black, often with an indistinct light brown patch centrally on midline not visible to naked eye. Rostrum brown basally becoming black apically, reaching bases of hind coxae. Antennae black. Without obvious pubescence above but nearly always bearing considerable silver pubescence below that sometimes extends onto anteclypeus and margins of postclypeus. *Thorax.* Pronotum ochraceous with extreme lateral margin capped brown; a broad ferruginous to black fascia on dorsal midline, this fascia spreading laterally both at its anterior end against pronotal margin as far as eyes, and at its posterior end against pronotal collar; pronotal collar either black or ferruginous or a mixture of both. Mesonotum pale to very dark ferruginous sometimes with a large blackish area anterior of cruciform elevation and a blackish fascia above wing groove; cruciform elevation often tending yellowish brown rather than ferruginous. Thorax above usually lacking pubescence but nearly always covered by silver pubescence below. *Wings.* Hyaline. Fore wings always with a zigzag

infuscation following basal veins of apical cells 2 and 3 and usually extending to 4; an indistinct infuscation also often present near wing apex at end of vein R1b; venation brown, costa pale muddy yellow or orange brown; basal membrane similar in colour to costa although usually brighter; basal cell faintly tinged amber or sometimes nearly hyaline; costa and veins lacking pubescence visible to naked eye. Hind wing usually with a small infuscation at distal end of vein 2A that sometimes extends part way along its length but some specimens entirely lacking infuscation; venation brown; plaga off-white and usually hidden by a weak amber suffusion on basal half or so of anal lobe. *Legs*. Medium to light brown; without markings. *Opercula*. Muddy pale yellow often partly suffused with black; usually covered by fine silver pubescence not obvious to naked eye; clearly separated exposing apex of sternite I and barely concealing tympanal cavities. *Abdomen*. Tergites brown; some individuals with anterior half of tergite 2 partly or entirely black, dorsal anterior half or more of tergites 3–8 black and 8 also sometimes black along posterior margin. Sternites brown, usually with a diffused dark brown midline. Abdomen above and below without obvious pubescence. *Tymbals* (Fig. 24). Usually 10 long tymbal ribs, otherwise as for generic description. *Genitalia* (Figs. 92, 93). Pygofer brown; upper pygofer lobes in lateral view broad, upper margin sometimes distinctly curved outwards in central region, distal end upturned with a broad pointed apex, in ventral view angled slightly inwards before midpoint; basal lobes with a broad webbing fusing outer and inner lobes, in lateral view outer lobe just a short finger-like projection beyond webbing. Uncal lobes scoop-like and gently upturned at their distal ends; lateral processes of uncus in lateral view nearly equal in length to upper pygofer lobes, usually a little constricted near base and angled slightly upwards beyond constriction, apex broadly rounded. Conjunctival claws simple, sharply pointed, directed laterally. Flabellum a large rounded lobe across entire ventral surface. Palaris low and rounded, near distal end of theca.

Female (Fig. 57b). Colour and markings similar to male. Abdominal segment 9 medium brown, often with dorsal beak dark brown and sometimes with dark brown patches mainly dorsally. Ovipositor sheath black and clearly extending beyond dorsal beak.

Measurements. $n = 10\text{♂♂}$, 10♀♀ (includes smallest and largest of available specimens). *Length of body*: male 15.5–19.0 (17.1); female 15.7–18.4 (17.5). *Length of fore wing*: male 19.1–21.9 (20.3); female 19.4–23.1 (21.1). *Width of head*: male 5.2–5.7 (5.4); female 5.2–5.7 (5.5). *Width of pronotum*: male 5.8–6.5 (6.2); female 5.8–6.9 (6.4).

Distinguishing features. A reasonably distinctive species that always has an obvious zigzag infuscation on the fore wing, a pale pronotum that contrasts markedly with a much darker mesonotum and darkened pronotal midline. The fore wings are broader and shorter than most other *Tryella* species with a fore wing length to hind wing length ratio clearly less than 2:1 (approximately 1.7:1).

Within the geographic range of *graminea* the most similar species are *T. ochra* and *T. castanea* and some individuals of *T. willsi*. Both *ochra* and *castanea* rarely have bold zigzag infuscations on the fore wings and, unlike *graminea*, *ochra* has a fore wing/hind wing length ratio approaching 2:1 and *castanea* entirely lacks amber suffusion on the hind wing anal lobe. Those individuals of *T. willsi* with dark reddish brown on the thorax above instead of the usual black, differ from *graminea* in having a fore wing/hind wing ratio at least 1.8:1.

Tryella graminea is the only *Tryella* species with distinct colour morphs (fore wing costa and fore wing basal membrane either orange or pale yellow).

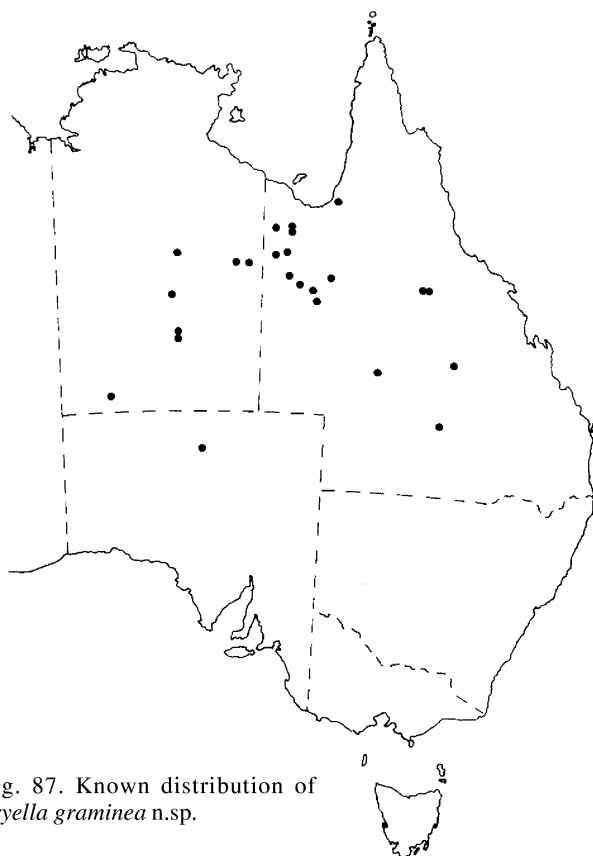


Fig. 87. Known distribution of *Tryella graminea* n.sp.

Distribution (Fig. 87). Central Australia south from Tennant Creek in Northern Territory to Oodnadatta in South Australia and west to Ayers Rock, and north-west and central Queensland from the Gulf of Carpentaria to Charleville. Adults emerge after heavy summer rains and are often locally common. There are records from late October to mid March.

Habitat. Native and introduced grasses, where adults tend to form local populations. Long, partly dead grass appears to be favoured.

***Tryella infuscata* n.sp.**

Figs. 65a,b, 71, 72, 88

Types. QUEENSLAND—Holotype ♂, K179856, 120 km S of Normanton, 14.i.1986, M.S. & B.J. Moulds, in AM. Paratypes as follows: 3♂♂ (2 male genitalic preparations Nos AB79, AB86), 7♀♀, same data as holotype; all in MSM.

Other material examined NORTHERN TERRITORY—1♂, Alexandria [19°03'S 136°42'E], S Australia, G.N. Stalker, 1907-261 (a paralectotype of *T. stalker*); all in BMNH. This specimen is labelled as coming from "S. Australia" because the Northern Territory was at that time administered by South Australia.

Etymology. From the Latin *infuscatus* and referring to the bold infuscations on the fore wings of this species.

Description

Male (Figs. 65a, 71, 72). *Head.* Ferruginous with areas of black concentrated around ocelli, around eyes except on supra-antennal plates and below; postclypeus and anteclypeus ferruginous. Rostrum ferruginous becoming black to varying extent towards apex but usually with extreme apex brown; passing bases but not reaching apices of hind coxae. Antennae brown to nearly black. Usually bearing some silver pubescence, especially below. *Thorax.* Pronotum ochraceous with a broad middorsal fascia dark ferruginous, this fascia spreading laterally both at its anterior end against pronotal margin to about eyes, and at its posterior end against pronotal collar; pronotal collar dark ferruginous often tending black, especially at lateral angles. Mesonotum dark ferruginous, usually with a dorsal pair of ill-defined obconical markings based on anterior margin weakly outlined in yellowish brown; cruciform elevation yellowish brown. Thorax above usually lacking noticeable pubescence; below medium to light brown and always with distinct silver pubescence. *Wings.* Hyaline. Fore wings always with a zigzag infuscation following basal veins of apical cells 2-4 and usually along the length of vein R1b forming base of apical cell 1, and to a lesser degree at distal end of apical cell 1; venation brown, costa muddy pale yellow; basal cell barely tinted brown; basal membrane orange, sometimes tending yellowish. Hind wings with an infuscation at distal extremity of vein 2A against wing margin; plaga off white; anal lobe weakly tinted brown primarily on basal two thirds; venation light brown to pale yellow. *Legs.* Brown without obvious markings. *Opercula.* Yellowish brown; almost meeting and barely concealing tympanal cavities; usually covered by silver pubescence not always obvious to naked eye. *Abdomen.* Tergites dark ferruginous with mid brown posterior margin and ventral surface mid brown; tergite 2 usually dominantly mid brown laterally and tergite 8 usually entirely mid brown except for dorsal anterior half. Sternites brown. Abdomen above and below often with silver pubescence not always visible to naked eye. *Tymbals.* Usually 10-11 long tymbal ribs, otherwise as for generic description. *Genitalia* (Figs. 71, 72). Pygofer dark ferruginous dorsally and on upper pygofer lobes, otherwise mid brown; upper pygofer lobe in lateral view very broad at base, gradually tapering to a blunt point, usually with a slight upward curve, in ventral view gently curving inwards; basal lobe in lateral view like a very long thin finger, gently curved, nearly equal in length to upper pygofer lobe, not fused with inner secondary lobe by broad webbing. Uncal lobes scoop-like and gently upturned at

their distal ends; lateral process of uncus in lateral view small and rounded. Conjunctival claws simple, sharply pointed, directed ventrally. Paelearis narrow; along much of length of theca and reaching distal end, gradually tapering to zero at proximal end.

Female (Fig. 65b). Colour and markings similar to male. Abdominal segment 9 brown, sometimes with dorsal beak dark ferruginous. Ovipositor sheath nearly black with brown ventral surface; extending just beyond dorsal beak.

Measurements. n = 4♂♂, 7♀♀ (includes all available specimens). *Length of body:* male 17.3-19.3 (18.5); female 18.9-22.7 (20.3). *Length of fore wing:* male 21.7-24.5 (23.0); female 23.9-26.9 (25.2). *Width of head:* male 6.0-6.6 (6.4); female 6.3-7.0 (6.6). *Width of pronotum:* male 6.3-6.9 (6.6); female 6.6-7.6 (7.1).

Distinguishing features. Distinguished from other species with extensive fore wing infuscations that reach to top of ulnar cell 3 (i.e. *noctua*, *occidens* and *stalker*) by its dark mesonotum and pale pronotum which bears a broad dark midline. Occasional individuals of *T. stalker* possess similar colouring; these can be separated (apart from distribution) by the anal lobe which is suffused golden amber in *stalker* and brown in *infuscata*. Male genitalia clearly differ in the size of the uncal lateral process which, in lateral view, is large and tapering in *stalker* (Fig. 67) but small and rounded in *infuscata* (Fig. 71).

Distribution (Fig. 88). Known only from inland districts below the Gulf of Carpentaria. There are just two known localities: 120 km south of Normanton in Queensland and Alexandria Station in Northern Territory.

Habitat. Adults most likely inhabit eucalypt trees. All known specimens have been taken at light.

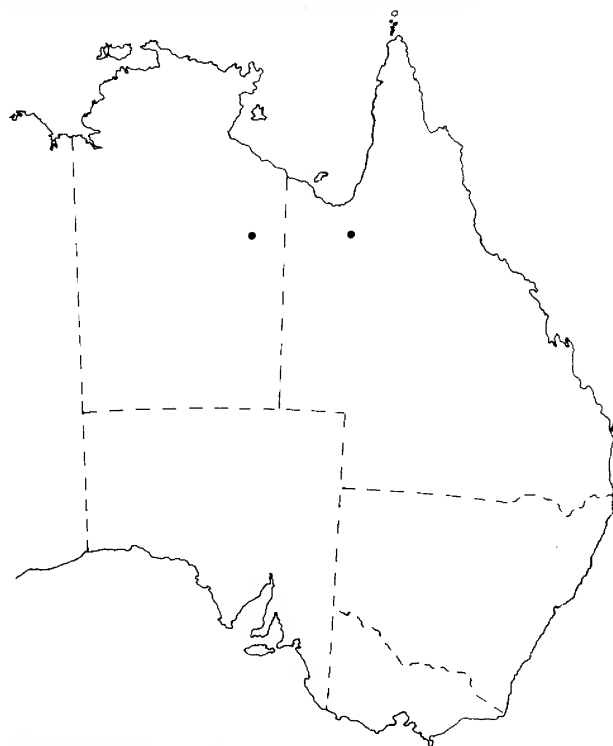


Fig. 88. Known distribution of *Tryella infuscata* n.sp.

Tryella kauma n.sp.

Figs. 11, 25, 52a,b, 89, 96, 97

Types. QUEENSLAND—Holotype ♂, K179842, Walkers Ck, 35 km NNE of Normanton, 16.xii.1986, M.S. & B.J. Moulds, in AM. Paratypes as follows: 1♂, 1♀, same data as holotype; 1♂, 1♀, 50 km SE of Normanton, 15.i.1986, MBM; all in AM. 1♂, Wernadinga Stn, SE of Burketown, 18.xii.1986, MBM; 18♂♂ (one male genitalic preparation no. AB12), 14♀♀, same data as holotype; 2♀♀, same data as holotype but 2.i.1990, 15.i.1992; 25♂♂ (one male genitalic preparation no. AB78), 18♀♀, 50 km SE of Normanton, 15.i.1986, MBM; 15♂♂ (one male genitalic preparation no. AB3), 18♀♀, East Haydon, 60 km SE of Normanton, 15.i.1986, MBM; 1♂, 25 km W of Croydon, 16.i.1986, MBM; 2♀♀, 28 km W of Georgetown, 16.i.1986, MBM; all in MSM. 1♂, 1♀, East Haydon, 60 km SE of Normanton, 15.i.1986, MBM, both in QM.

Etymology. From the Greek *kauma* meaning burning heat and referring to the hot climatic conditions prevailing in the area where the species is found.

Description

Male (Figs. 25, 52a, 96, 97). *Head.* Black but usually with variable amounts of brown visible under magnification, nearly always partly or entirely brown on antennal plates and often to some extent between eyes and ocelli; postclypeus and anteclypeus ferruginous. Rostrum muddy pale yellow basally, darkening on labium and becoming black towards apex but always with extreme apex dark brown; passing beyond bases of hind coxae but never reaching their apices. Antennae black or brown but usually with basal segment, and sometimes part of second segment, brown. Without extensive silver pubescence above but usually extensive below except of clypeus. *Thorax.* Pronotum ochraceous with a broad middorsal fascia pale to very dark ferruginous or sometimes nearly black, this fascia spreading laterally both at its anterior end against pronotal margin to about eyes and at its posterior end against pronotal collar; pronotal collar ferruginous to nearly black but always pale anterior of lateral angles. Mesonotum ferruginous, often black or very dark brown immediately anterior of cruciform elevation and along lateral margin above wing bases; cruciform elevation usually light brown but sometimes dark. Thorax above often lacking noticeable pubescence; below medium to light brown and always with distinct fine silver pubescence. *Wings.* Hyaline. Fore wings usually with some infuscation limited to bases of apical cells 1–3 and apex of apical cell 1, sometimes continuous but often broken and occasionally entirely without infuscation; venation brown, costa pale to medium ochraceous but sometimes tinted ferruginous; basal cell hyaline; basal membrane orange or orange yellow. Hind wings with a weak infuscation at the distal end of vein 2A and often following along much of the length of 2A, sometimes also adjacent to off white plaga on 3A; venation brown. *Legs.* Light to medium brown; without markings. *Opercula.* Muddy yellow, usually with very narrow black edge along lateral margin; usually covered by silver pubescence not always obvious to naked eye; clearly separated exposing apex of sternite I and barely concealing tympanal cavities. *Abdomen.* Tergites brownish orange to dark brown, often with tergite 1 black or nearly so, often tergites 2 and 3 partly or entirely black on anterior half and sometimes also on tergites 4–7; tergite 8 usually black or dark brown on anterior half. Sternites light brown. Abdomen above and below often

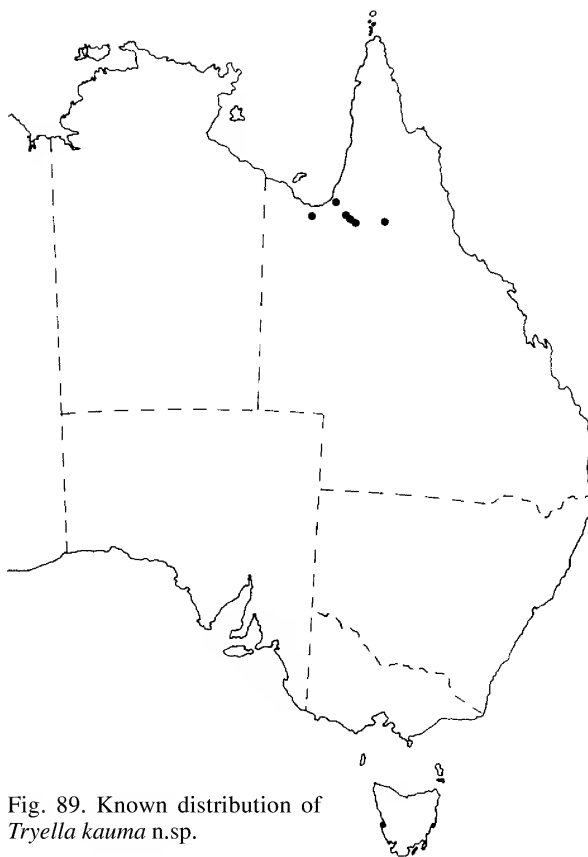


Fig. 89. Known distribution of *Tryella kauma* n.sp.

with silver pubescence not always visible to naked eye. *Tymbals* (Fig. 25). Usually 9 long tymbal ribs, otherwise as for generic description. *Genitalia* (Figs. 96, 97). Pygofer brownish orange to dark brown; upper pygofer lobes in lateral view broad, upper margin distinctly curved outwards in central region, lower margin curved upwards near distal end towards an upturned pointed apex, in ventral view angled slightly inwards; basal lobes with a broad webbing fusing outer and inner lobes, in lateral view outer lobe just a short finger-like projection beyond webbing. Uncal lobes scoop-like and gently upturned at their distal ends; lateral processes of uncus in lateral view nearly equal in length to upper pygofer lobes, angled slightly upwards from near base, apex tapering to a rounded point. Conjunctival claws simple, sharply pointed, directed laterally. Flabellum a large rounded lobe across entire ventral surface. Palaris absent.

Female (Figs. 11, 52b). Colour and marking similar to male. Abdominal segment 9 brown, tending palest ventrally; dorsal beak dark brown or black. Ovipositor sheath black and clearly extending beyond dorsal beak.

Measurements. $n = 10♂♂, 10♀♀$ (includes smallest and largest of available specimens). *Length of body:* male 11.6–15.8 (13.8); female 13.8–17.1 (15.8). *Length of fore wing:* male 15.3–20.7 (18.3); female 17.7–20.6 (19.8). *Width of head:* male 4.6–5.9 (5.1); female 4.9–6.0 (5.4). *Width of pronotum:* male 4.7–6.0 (5.1); female 4.8–6.1 (5.5).

Distinguishing features. Although *T. kauma* is confined to Queensland, adults closely resemble *T. adela* from the Northern Territory and the form of *T. castanea* found near the Victoria River, Northern Territory. There are, however,

clear differences between these species in male genitalia (compare Figs. 84, 86 and 97). Electrophoretic comparison between *castanea* and *kauma* (Serkowski & Moulds, unpub. data) showed a 21% fixed difference, clearly separating these two species; electrophoretic data comparing *kauma* and *adela* were not available.

Within the range of *T. kauma* there can be close resemblance with some individuals of *T. ochra* and *T. burnsi* although the latter species may not be sympatric as there is doubt about the identity of the single record falling within the range of *kauma*. Usually *kauma* can be distinguished from *ochra* and *burnsi* by its smaller size (fore wing length never reaching 22 mm) and by having the fore wing basal cell hyaline. The known distribution of *T. castanea* approaches close to that of *kauma* and may be sympatric around Burketown or Normanton. *Tryella kauma* can be distinguished from *castanea* using the same characters that distinguish *kauma* from *burnsi*.

Distribution (Fig. 89). Lower Gulf region of Queensland east to near Georgetown. There are records from only Wernadinga Station SE of Burketown, near Normanton, near Croydon and 25 km W of Georgetown. Adults have been taken from mid December to mid January, after heavy summer rains.

Habitat. Adults most likely inhabit eucalypt trees and saplings. Nearly all known specimens have been taken at light. The single specimen from Wernadinga Station was taken in grass but this was most likely an accidental occurrence.

Song. Singing occurs both during the day and especially at dusk.

Tryella lachlani n.sp.

Figs. 12, 56a,b, 73, 74, 90

Species "G" Ewart, 1993: 139–140, fig. 14.

Abrieta sp.—Zborowski & Storey, 1995: 87 (figured).

Types. QUEENSLAND—Holotype ♂, K179837, York Downs, 50 km E of Weipa, 28.xii.1983, MBM, in AM. Paratypes as follows: 2♂♂, K179838 and K179839, 2♀♀, K179840 and K179841, same data as holotype; 2♂♂, K46340, K179986, Moa, Banks I., Torres St., 10.i.1920, W. McLennan; all in AM. 1♂, Hammond Island, 10.i.1964, B.M. 1964-179, M. Nikitin, in BM. 4♂♂ (1 male genitalic preparation no. AB19), 4♀♀, Hammond Island, Torres Strait, 14.i.1987, R.B. Lachlan; 1♂, Hammond Island, Torres Strait, 14.xiii.1974, R.B. Lachlan; 57♂♂ (3 male genitalic preparations Nos AB18, AB80, AB87), 38♀♀, same data as holotype; 4♂♂, 2♀♀, waterhole nr Wenlock Riv, x-ing, Portland Roads rd, 13°06'S 142°56'E, 120 m, 31.xii.1994, GAD; 1♀, near Mt Croll N of Coen, 8.i.1988, MBM; all in MSM. 2♂♂, 1♀, same data as holotype; all in QM. 1♀, Moa I., Torres Strait, (no date), J.W. Schomberg, in SAM. PAPUA NEW GUINEA—1♂, Oriomo Agr. Sta, W Distr., i–iv.1960, G. Rio, in DPB.

Etymology. Named after Robert Lachlan who collected the first examples of this species seen by me, as well as many other rare and valuable cicadas.

Description

Male (Figs. 56a, 73, 74). *Head.* Black with ferruginous postclypeus that sometimes has its midline blackened; anteclypeus ferruginous to black. Rostrum brown and black, usually black dorsally and at apex; passing bases

but not apices of hind coxae. Antennae black or brown. Head usually with some fine silver pubescence, primarily confined to lorum below. *Thorax.* Pronotum ochraceous with a broad black middorsal fascia that spreads laterally both against anterior margin to back of eyes and against posterior margin to merge with black pronotal collar. Mesonotum ferruginous except for black around cruciform elevation, this black pale on teneral or partly teneral individuals. Thorax above usually without obvious silver pubescence. Thorax below black or nearly so and bearing fine silver pubescence. *Wings.* Hyaline. Fore wings usually without noticeable infuscations but often with an extremely weak infuscation at distal end of apical cell 1 and a few individuals also very weakly infuscated at base of apical cell 2 and sometimes 3; venation black or sometimes brown, costa ochraceous; basal cell weakly tinted translucent amber; basal membrane orange; costa and veins on basal third or so sometimes bearing a little silver pubescence not visible to naked eye. Hind wings with a smoky black infuscation at distal end of vein 2A which, in most specimens, fills the distal end of anal lobe, the proximal end sharply pointed; remainder of anal lobe suffused translucent amber hiding cream plaga; venation tending pale brown basally becoming dark towards apex. *Legs.* Ferruginous often with black in region of fore leg femoral spines. *Opercula.* Black or nearly so; usually covered by silver pubescence not always obvious to naked eye; clearly separated exposing apex of sternite I and barely concealing tympanal cavities. *Abdomen.* Tergites black with much of dorsal and subdorsal area ochraceous; tergite 2 substantially black; tergite 3 black with ochraceous dorsal band along posterior margin; tergites 4–7 dominantly ochraceous with black increasingly reduced to sublateral region; tergite 8 black on anterior half or a little less, otherwise ferruginous. Sternite 2 black; sternites 3–8 ferruginous, 3–6 often with pale cream posterior margins to varying extent. Abdomen above and below without noticeable pubescence. *Tymbals.* Usually 11 long tymbal ribs, otherwise as for generic description. *Genitalia* (Figs. 73, 74). Pygofer black and ochraceous, usually black dorsally and partly or entirely so laterally; upper pygofer lobe in lateral view very broad at base, gradually tapering to a sharp or rounded point at apex, and usually very gently curved upwards, in ventral view nearly straight and tilted slightly inwards; basal lobe in lateral view like a very long thin finger, gently curved, nearly equal in length to upper pygofer lobe, not fused with inner secondary lobe by broad webbing. Uncal lobes scoop-like and gently upturned at their distal ends; lateral process of uncus in lateral view small and rounded. Conjunctival claws simple, sharply pointed, directed ventrally. Flabellum a very small mid-ventral rounded lobe. Palaris adjoining flabellum and continuing along much of length of theca, small and gradually tapering to zero at proximal end.

Female (Figs. 12, 56b). Colour and markings similar to male except for abdomen above. Dorsal and subdorsal areas dominantly ochraceous but usually less brilliant than that of male, otherwise black; a black middorsal blotch usually present at base; tergite 8 always with a distinct black band following anterior margin. Abdominal segment 9 dull ochraceous to brown with dorsal area and dorsal beak black. Ovipositor sheath black or dark brown; extending clearly beyond dorsal beak.

Measurements. $n = 10\text{♂♂}$, 10♀♀ (includes smallest and largest of available specimens). *Length of body*: male 15.1–19.2 (17.0); female 17.1–20.0 (18.4). *Length of fore wing*: male 22.1–25.3 (23.1); female 22.0–27.1 (24.1). *Width of head*: male 5.7–7.1 (6.3); female 6.4–7.0 (6.8). *Width of pronotum*: male 5.7–7.3 (6.4); female 6.2–7.2 (6.9).

Distinguishing features. It is unlikely that the distinctive male of this species, with its bright ochraceous pronotum and abdominal tergites, will be confused with that of any other *Tryella* species.

Females are less distinctive but nevertheless are readily identifiable by their ochraceous pronotum and abdomen, lack of (or rudimentary) fore wing infuscations and their black or blackish cruciform elevations. Confusion is most likely to occur between atypical females of *lachlani* and atypical females of *burnsi*; the black cruciform elevation of *lachlani* immediately distinguishes it from *burnsi* which always has the cruciform elevation light brown. The *Key to species* should resolve doubtful cases.

Distribution (Fig. 90). South-west Papua New Guinea, Torres Strait islands and northern Cape York Peninsula of Queensland. The specimen from Oriomo on mainland Papua New Guinea just north of Daru Island, represents the only record of any *Tryella* or allied species from Papua New Guinea. From Queensland there are records from just five localities, Moa Island (= Banks Is.), Hammond Island, near Heathlands Station (Ewart, 1993), York Downs (50 km east of Weipa) and near Mt Croll (near Coen). This species is sometimes locally common. Adults have been taken in December and January but they may also occur later in the season.

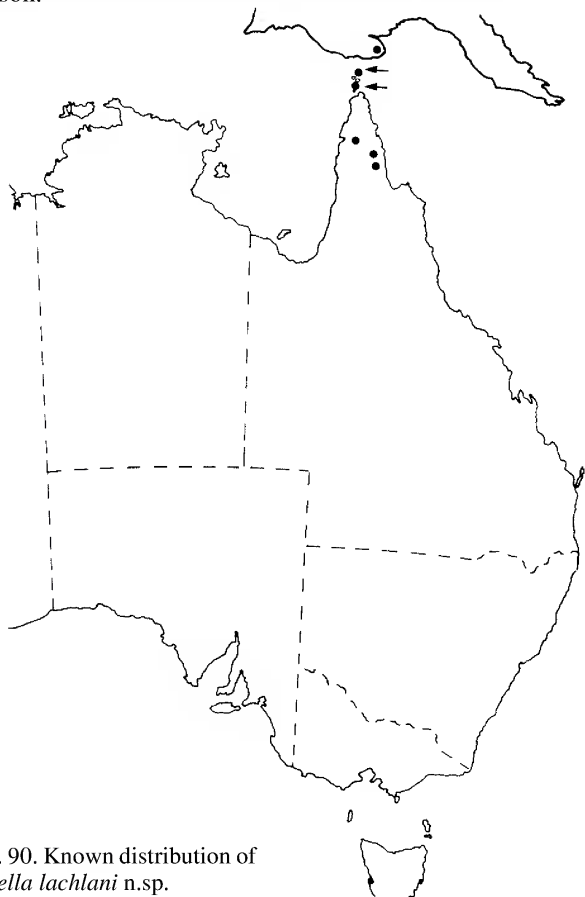


Fig. 90. Known distribution of *Tryella lachlani* n.sp.

Habitat. Open *Melaleuca* woodland where adults favour the outer branches of these trees. There are no confirmed reports of adults inhabiting other tree species.

Song. Adults sing both during the day and at dusk. Ewart (1993) describes the song of this species (his Species G) as “a continuous, rapidly pulsating, high pitched humming, quite soft, and not easily located”. A frequency range from 1–10kHz was noted by Ewart and he provides an oscillogram and frequency graph of the call.

Tryella noctua (Distant, 1913), n.comb.

Figs. 26, 48, 49, 64a,b, 91

Abricta noctua Distant, 1913: 487; Ashton, 1915: 91; Distant, 1915: 53; Burns, 1957: 636, 637; Metcalf, 1963: 209; Duffels & van der Laan, 1985: 235; Moulds, 1990: 121–122, pl. 15, figs 2, 2a.

Abricta rufonigra Ashton, 1914: 349, pl. 17.

Types

(a) *Abricta noctua*. Lectotype male here designated, bearing four labels: (i) “*Abricta/noctua*/Dist./type” handwritten in black ink, probably original Distant label; (ii) “Type/H.T.” small white circular label with red border on which is machine printed; (iii) “SYN-/TYPE” small white circular label with blue border on which is machine printed; (iv) “Australia./W.W.Froggatt,/1913-364” rectangular machine printed label (in BMNH). Examined.

Lectotype designation. Distant (1913) did not designate a holotype or state the number of specimens examined. While it is probable that he had only the one specimen listed above, following Recommendation 73F of the *Code* to consider such specimens as syntypes, and in the absence of any other previous designation of this specimen as type, this specimen is designated lectotype.

Type locality. The last label listed above for the lectotype is a BMNH label indicating from where the Museum obtained the specimen and its registration number. There is no label giving locality, date of collection or name of collector. The original description states “Hab. N.W. Australia, Cue (H.W. Brown, type in Brit. Mus.)” and there is no reason to doubt that this is the true type locality.

(b) *Abricta rufonigra*. Lectotype male here designated (in SAM) (examined). Bearing three labels as follows: (i) “Cue, W.A./H.W. Brown” small machine printed label; (ii) “*Abricta rufonigra* Ashton./Type” hand printed in India ink; (iii) “*Abricta rufonigra* Ashton./Syn. of *A. noctua* Dist./W.A./Type. I2939, I4960”.

Lectotype designation. Ashton’s (1914) description of *A. rufonigra* is based on an unstated number of specimens of unstated sex from “Western Australia: Cue”, although it is likely that only one male was available for the description. In the SAM there are a further male and two females bearing similar data as the specimen labelled “Type”. However, measurements of one of the females are not compatible with those stated in the original description despite an additional label attached to this specimen stating “2939 *Abricta rufonigra*” and what appears to be the words “*willsi* W L Dist” and “n. sp.”. Further, there are two males and two females in ANIC also labelled Cue and possibly old enough to have been seen by Ashton.

While it is most likely that the male “type” is in fact a holotype it is not possible to categorically deny it forms part of a syntype series. To clarify the identity of this name the specimen detailed above is here designated lectotype.

Note on synonymy. Following publication of his description of *A. rufonigra*, Ashton found that Distant had described the species as *A. noctua* the preceding year. Consequently Ashton (1915) placed *A. rufonigra* as a junior synonym of *A. noctua*. H.W. Brown often divided his field catches between Distant and Ashton which also led to the creation of synonymies for other cicada species.

Material examined. Types and the following: WESTERN AUSTRALIA—1♂, K179960, 1♀, K179961, Cue, no date, H.W. Brown, H. Ashton Coll.; 1♀, K179836, 55 km SE of Leinster, 28°20'S 121°05'E, 16.i.1989, MBM; 1♂, K179835, Leonora, 15.i.1989, MBM; all in AM. 2♂♂, 2♀♀, Cue, ex W.W. Froggatt Collection; all in ANIC. 1♂, 60 km W of Sandstone, 18.i.1989, MBM; 1♂, 1♀, Sandstone, 18.i.1989, MBM; 1♀, 40 km E of Sandstone, 17.i.1989, MBM; 1♂, “Depot Springs”, 27°56'S 120°05'E, 17.i.1989, MBM; 1♂, 3♀♀, Agnew, 17.i.1989, MBM; 1♂, 4♀♀, 17 km ENE of Agnew, 27°59'S 120°41'E, 17.i.1989, MBM; 7♂♂, 11♀♀, 55 km SE of Leinster, 28°20'S 121°05'E, 16.i.1989, MBM; 9♂♂ (1 male genitalic preparation no. AB22), 11♀♀ (1♀ ex exuviae), Leonora, 15,16.i.1989, MBM; 1♀, White Cliffs [NE of Laverton], 18.i.1978, M. Powell; all in MSM. 1♂, 2♀♀, Cue, (no date), H.W. Brown; all in SAM. 1♀, 55 km SE of Leinster, 28°20'S 121°05'E, 16.i.1989, MBM; 1♂, Leonora, 15,16.i.1989, MBM; 1♂, reg. no. 34332, Winburn Rocks, 94 km E of Warburton, 26°05'S 127°30'E, 22.i.1990, T.F. Houston & M.S. Harvey; 3♂♂, 1♀, reg. nos. 34326–34329, 2.5 km N of Mt Linden, 29.19°S 122.25°E, 17–23.iii.1979, T.F. Houston *et al.*; 1♀, reg. no. 34317, Weld Range, 2.iii.1963, A. Douglas; 1♀, reg. no. 34318, Prairie Downs Stn, i/iii.1963, C. Snell; 1♀, reg. no. 34320, Mileura, nth Cue, 16.xii.1969, E. Lindgreen; 1♀, reg. no. 34319, 50 m W Charles Knob, approx. 300 m NE Laverton, 25°S 124°E, 30.i.1964, M. Gillett; 3♂♂, 3♀♀, reg. nos. 34302, 34321, 34323–34325, 34333, 3.8 km, c. 7 km NE and 13.8 km ENE of Comet Vale Siding, 29°57'S 121°07'E, 7–15.iii.1979, T.F. Houston *et al.*; 2♀♀, reg. nos. 34330–34331, 6 km NE of Mt Cooper, 26°11'S 127°57'E, 21.i.1990, T.F. Houston & M.S. Harvey; 1♀, reg. no. 34322, same data but, on branches of mulga; all in WAM. NORTHERN TERRITORY—3♂♂, 1♀, small hill 20 km E of Glen Helen Gorge, 28.i.1984, MBM; 3♂♂, Ayers Rock, 3.ii.1984, MBM; all in MSM. SOUTH AUSTRALIA—8♂♂, 3♀♀, 17 km S of Chandler railway siding, 5.ii.1984, MBM; 1♂, 2♀♀, 24 km NW of Marla, 5.ii.1984, MBM; 1♂, 1♀, 30 km S of Mt Willoughby Stn, 6.ii.1984, MBM; 1♂, 13 km N of The Twins Hsd, Stuart Hwy, 7.ii.1984, MBM; 2♂♂, 1♀, Coober Pedy, 23.xii.1988, S. Lamond; all in MSM.

Description

Male (Figs. 26, 48, 49, 64a). *Head.* Black, often with a very small muddy yellow marking on midline against posterior margin not discernible to naked eye; postclypeus black, sometimes with areas dark ferruginous, below often with a yellow margin barely discernible to naked eye; anteclypeus black, sometimes with a little ferruginous not discernible to naked eye. Rostrum tending brown basally but otherwise black; reaching bases of hind coxae. Antennae black. Often bearing some silver pubescence, especially below. *Thorax.* Pronotum with a broad black fascia on dorsal midline, otherwise dark ferruginous; pronotal collar black, on some individuals tending partially brown on lateral angles. Mesonotum sometimes almost entirely black but usually dark ferruginous with black markings, the black appearing as a fascia bordering wing grooves and as a broad middorsal fascia that often incorporates a pair of very dark ferruginous obconical markings based on anterior margin; cruciform elevation black or dark brown. Thorax above often with some silver pubescence; below usually substantially covered by silver pubescence. *Wings.* Hyaline. Fore wings

always with a bold zigzag infuscation following basal veins of apical cells 2–4 and usually also along the length of vein R1b forming apical cell 1; venation black, costa dark brown; basal cell barely tinted brown; basal membrane dark grey; costa and veins on basal half or so of wing usually with some silver pubescence not always discernible by naked eye. Hind wings with infuscations bordering plaga along vein 2A and 3A; plaga off white; venation muddy-yellow to brown. *Legs.* Black and brown to varying extent but usually with tibiae dominantly black. *Opercula.* Brown to nearly black but usually tending brown across posterior margin; often bearing fine silver pubescence usually discernible to naked eye; clearly separated exposing apex of sternite I and barely concealing tympanal cavities. *Abdomen.* Tergites black or nearly so, sometimes with a little dark brown mainly confined to tergites 2 and 8. Sternites dark brown with a broad black midline, sometimes almost entirely black, the black always reaching full width of sternite VII but contracting on its anterior half; sternite VIII always entirely black or nearly black. Abdomen above and below usually with silver pubescence visible to naked eye. *Tymbals* (Fig. 26). Usually 10 long tymbal ribs, otherwise as for generic description. *Genitalia* (Figs. 48, 49). Pygofer black or nearly so; upper pygofer lobes in lateral view broad, slightly tapering to a broad rounded apex, in ventral view slightly angled inwards with the subdivision of terminal section clearly visible externally as a stepped profile; basal lobes without webbing fusing inner and outer lobes, outer lobe in lateral view like a very long thin finger, gently curved, almost equal in length to upper pygofer lobe. Uncal lobes scoop-like and gently upturned at their distal ends; lateral processes of uncus in lateral view broad at base but steeply tapering on basal third, thereafter narrow and parallel-sided, apex rounded. Conjunctival claws simple, sharply pointed, directed ventrally. Flabellum absent. Palaris on distal third of theca, reaching distal end, nearly even in width but tapering abruptly at proximal end.

Female (Fig. 64b). Colour and markings similar to male. Abdominal segment 9 black dorsally, usually becoming partially dark brown ventrally. Ovipositor sheath black; clearly extending beyond dorsal beak.

Measurements. $n = 10♂♂, 10♀♀$ (includes smallest and largest of available specimens). *Length of body:* male 18.6–24.4 (22.0); female 20.3–25.8 (23.7). *Length of fore wing:* male 23.8–29.0 (26.9); female 25.7–31.9 (29.0). *Width of head:* male 6.6–8.0 (7.4); female 6.9–8.6 (7.8). *Width of pronotum:* male 6.8–8.9 (7.9); female 7.4–9.4 (8.5).

Distinguishing features. This species is remarkably similar to *T. occidens* but is easily distinguished by the colour of the postclypeus which is black or very nearly so in *noctua* but ferruginous brown in *occidens*. However, there are major differences in male genitalia between these two species (see *T. occidens* for details).

There is also similarity between *T. noctua* and darker individuals of *T. stalker*. The latter species is never nearly black and the hind wing plagal area along vein 3A entirely devoid of black.

Distribution (Fig. 91). Arid regions of Central and Western Australia south of the Tropic of Capricorn in areas receiving less than 300 mm average annual rainfall. From Western

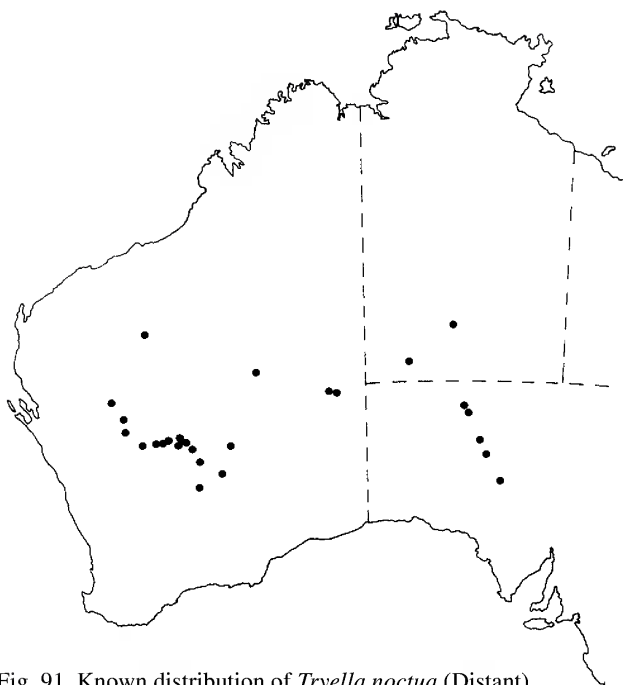


Fig. 91. Known distribution of *Tryella noctua* (Distant).

Australia there are records from as far west as Mileura Station, north as far as Prairie Downs and south to Comet Vale near Menzies. From the Northern Territory there are records from a small hill 20 km east of Glen Helen Gorge, and from near Ayers Rock. All South Australian records are from along the Stuart Hwy between Chandler and Coober Pedy. Adults have been taken from mid December to late March.

Habitat. Mulga (*Acacia aneura*) and possibly other shrubs and small trees. Adults tend to perch along small branches where they are often well camouflaged.

Song. Adults sing both during the day and at dusk; otherwise unknown.

Tryella occidentens n.sp.

Figs. 66a,b, 100–102

Types. WESTERN AUSTRALIA—Holotype ♂ (genitalic preparation no. AB23), K179834, Carnarvon, 26.ii.1977, MBM, in AM. Paratypes as follows: 4♂♂, 2♀♀, Carnarvon, 24,25,26.ii.1977, MBM; 2♂♂ (one male genitalic preparation no. AB24), Carnarvon, 4.ii.1975, 10.v.1981, K. & E. Carnaby; 1♂ (genitalic preparation no. AB48), 4♀♀, Lyndon R. crossing, NW Coastal Hwy, 28.ii.19184, 19.ii.1985, at light, K. & E. Carnaby; all in MSM. 1♂, Gascoyne R, Carnarvon, 3.iii.2001, P. Hutchinson, in PH.

Etymology. From the Latin *occidens* meaning in the direction of the setting sun and referring to the extreme western distribution of this species in Australia.

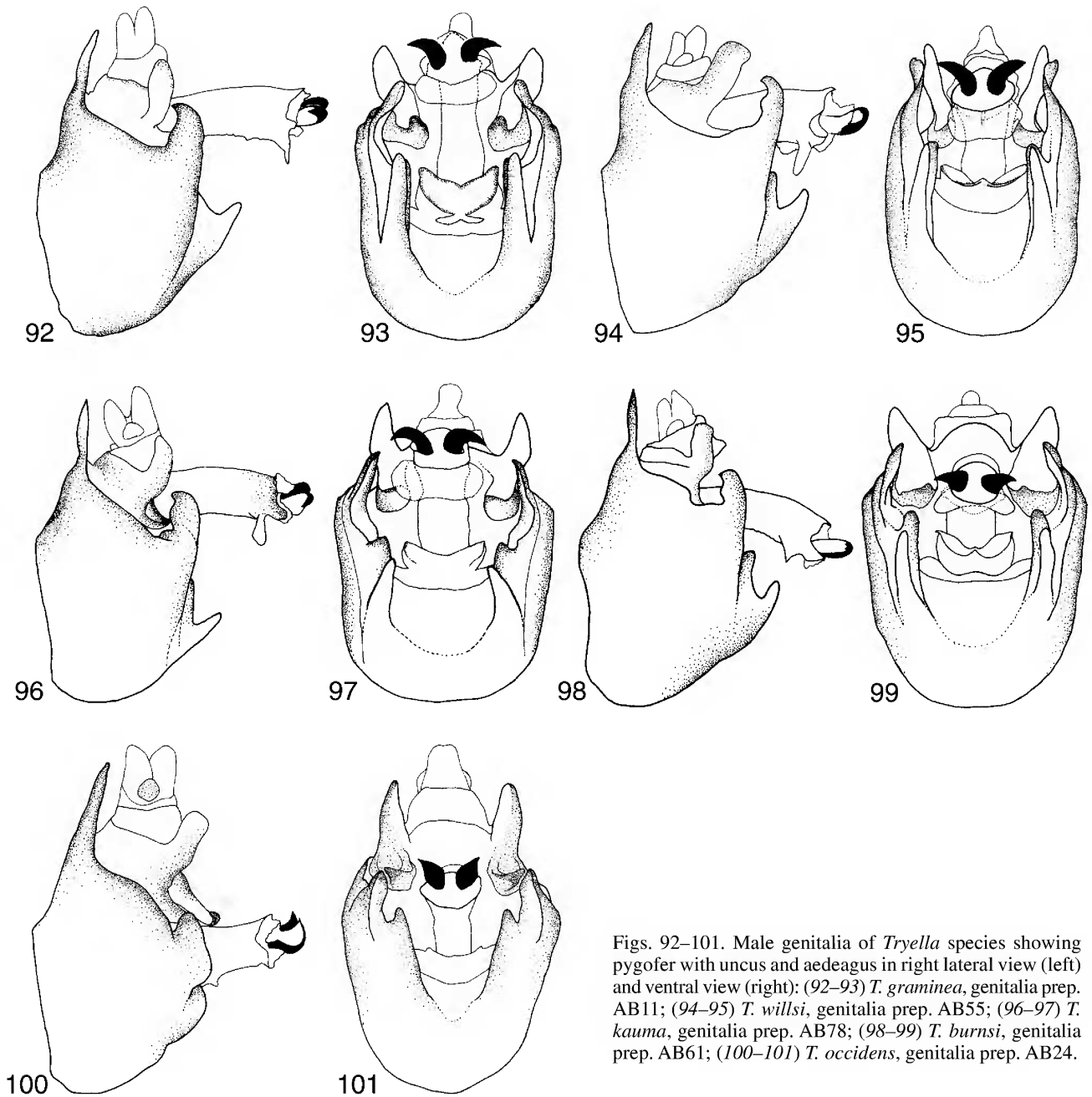
Description

Male (Figs. 66a, 100, 101). *Head.* Black or dominantly so on most individuals, sometimes dark ferruginous, and usually with a very small muddy yellow marking on midline against posterior margin, not discernible to naked eye; postclypeus ferruginous; anteclypeus ferruginous but

usually a little darker than postclypeus except along midline. Rostrum muddy yellow basally becoming black towards apex particularly on labium, but always with extreme apex dark brown; reaching to or just beyond bases of hind coxae. Antennae black or sometimes dark brown. Often bearing some silver pubescence, especially below. *Thorax.* Pronotum dark ferruginous, sometimes with a broad fascia along midline a little darker or a little paler than remainder; pronotal collar usually very dark ferruginous, especially at lateral angles. Mesonotum dark ferruginous, sometimes with an adjacent pair of obconical markings based on anterior margin a little paler; cruciform elevation similar in colour to majority of mesonotum. Thorax above often with some silver pubescence; below substantially covered by silver pubescence. *Wings.* Hyaline. Fore wings always with a bold zigzag infuscation following basal veins of apical cells 2–4 and also along the length of vein R1b forming apical cell 1; venation and costa brown; basal cell tinted brown, sometimes barely so; basal membrane dark grey to brown; costa and veins on basal half or so of wing usually with some silver pubescence, not always discernible to naked eye. Hind wings with infuscations bordering plaga along veins 2A and 3A; plaga off white, following length of vein 2A, almost the length of 3A, and the inner margin of anal lobe almost to distal end of 3A; venation muddy yellow, sometimes tending brown. *Legs.* Mid brown, without obvious tonal contrasts or markings. *Opercula.* Medium to dark grey tending yellowing or reddish brown and with little tonal variation; often bearing fine silver pubescence usually visible to naked eye; clearly separated, exposing apex of sternite I and barely concealing tympanal cavities. *Abdomen.* Dark ferruginous to nearly black, of even or nearly even tone but usually with tergite 2 paler laterally and tergite 8 black or nearly so along posterior margin. Sternites similar in colour to tergites although sometimes a little paler near base. Abdomen above and below usually with silver pubescence visible to naked eye. *Tymbals.* Usually 11 long tymbal ribs, otherwise as for generic description. *Genitalia* (Figs. 100, 101). Pygofer dark ferruginous to nearly black; upper pygofer lobes in lateral view stunted, very broad and rounded, in ventral view tilted slightly inwards; basal lobe entirely lacking outer lobe, the inner lobe normal. Uncal lobes with mediobasal part of each developed into a robust hook turned outwards and upwards; lateral processes of uncus in lateral view well-developed, straight, parallel-sided, apex nearly square. Conjunctival claws simple, sharply pointed, directed dorsolaterally. Flabellum absent. Pallearis a small rounded flange set on a small but prominent raised lobe situated about one quarter length of theca from its distal end.

Female (Fig. 66b). Colour and markings similar to male. Abdominal segment 9 usually slightly paler than tergites; dorsal beak usually darker and sometimes nearly black. Ovipositor sheath ferruginous brown usually darkest towards apex; clearly extending beyond dorsal beak.

Measurements. n = 8♂♂ and 6♀♀ (includes all available specimens). *Length of body:* male 19.5–22.0 (20.6); female 21.0–24.0 (23.4). *Length of fore wing:* male 24.9–27.7 (26.5); female 25.8–29.5 (28.2). *Width of head:* male 7.3–7.8 (7.5); female 7.3–8.6 (8.0). *Width of pronotum:* male 7.4–9.0 (8.0); female 7.9–9.1 (8.6).



Figs. 92–101. Male genitalia of *Tryella* species showing pygofer with uncus and aedeagus in right lateral view (left) and ventral view (right): (92–93) *T. graminea*, genitalia prep. AB11; (94–95) *T. willsi*, genitalia prep. AB55; (96–97) *T. kauma*, genitalia prep. AB78; (98–99) *T. burnsi*, genitalia prep. AB61; (100–101) *T. occidens*, genitalia prep. AB24.

Distinguishing features. This species is remarkably similar to *T. noctua* but can be distinguished by the colour of the postclypeus which is ferruginous in *occidens* but black or nearly so in *noctua*. However, there are major differences in male genitalia between these two species, the most significant being the direction of the conjunctival claws (outturned and partly upturned in *occidens*, downturned in *noctua*) and the shape and position of the lateral processes of the uncus and the basal pygofer lobes (broad and adjacent in *occidens*, relatively slender and widely separated on *noctua*—compare Figs. 48 and 100).

The male genitalia of *occidens* clearly differ from all other *Tryella* species. The partially upturned conjunctival

claws are unique and the upper pygofer lobes are short and rounded with a low profile.

Tryella occidens is also similar to darker individuals of *T. stalkerii*. The latter species lacks the black pigmentation on the hind wing adjacent to vein 3A that is always obvious on *occidens*.

Distribution (Fig. 102). Far west of Western Australia where there are records only from around Carnarvon and the Lyndon River crossing some 150 km north of Carnarvon. Adults have been taken in February, March and May.

Habitat. Adults inhabit trees or large shrubs.

Fig. 102. Known distribution of *Tryella ochra* n.sp.***Tryella ochra* n.sp.**

Figs. 27, 55a,b, 69, 70, 103

Types. Holotype ♂, K179894, Walkers Ck, 35 km NNE of Normanton, N Queensland, 2.i.1990, M.S. & B.J. Moulds, in **AM**. Paratypes as follows: QUEENSLAND—2♂♂, 1♀, same data as holotype; all in **AE**. 2♂♂, K179895 and K179896, 1♀, K179897, same data as holotype; all in **AM**. 1♂, 1♀, same data as holotype; 1♂, Silver Plains Homestead, Cape York Pens. 28.xi.1961, J.L. Wassell; all in **ANIC**. 2♂♂, 1♀, same data as holotype; all in **ASCU**. 2♂♂, 1♀, Walkers Ck, 35 km NNE of Normanton, N Queensland, 2.i.1990, MBM; all in **BMNH**. 2♂♂, 1♀, same data as holotype; all in **JM**. 2♂♂, 1♀, Walkers Ck, 35 km NNE of Normanton, N Queensland, 2.i.1990, MBM; all in **JO**. 2♂♂, 1♀, Walkers Ck, 35 km NNE of Normanton, N Queensland, 2.i.1990, MBM; all in **LP**. 2♂♂, 1♀, Walkers Ck, 35 km NNE of Normanton, N Queensland, 2.i.1990, MBM; all in **MNHP**. 1♂, 1♀, nr Thornton Hsd, 120 km ENE of Camooweal, 21.xii.1986, MBM; 1♂, Beames Brook, Burketown/Gregory rd jct. 20.xii.1991, MBM; 1♂, Fitzmaurice Ck, N of Normanton, 3.i.1990, MBM; 134♂♂ (1 male genitalic preparation no. AB7), 58♀♀, Walkers Ck, 35 km NNE of Normanton, 16,18.xii.1986, 2,3.i.1990, 15.i.1992, MBM; 2 male, 2♀♀, Normanton, 15,17.i.1986, MBM; 6♀♀, Walkers Bend, Flinders R., 60 km SSW of Normanton, 14.i.1986, MBM; 2♂♂, 120 km S of Normanton, 14.i.1986, MBM; 1♂, 4♀♀, 28 km E of Croydon, 16.i.1986, MBM; 2♂♂, 6♀♀, 50 km SE of Normanton, 15.i.1986, MBM; 1♂, 17♀♀, East Haydon, 60 km SE of Normanton, 15.i.1986, MBM; 3♂♂, 80 km ESE of Normanton, 16.i.1992, MBM; 36♂♂ (1 male genitalic preparation no. AB5), 9♀♀, Morehead R. x-ing, 35 km S of Musgrave Hsd, Cape York Pen., 10.i.1988, 9.i.1990, MBM; 1♂, 16 km SE of Hann R. x-ing, NW of Laura, 12.i.1990, MBM; 6♂♂ (1 male genitalic preparation no. AB57), Laura, 25.xii.1978, AMW-H; 3♂♂, 1♀, Little Laura R. via Laura, 24.xii.1978, R.I. Storey; 6♂♂ (1 male genitalic preparation no. AB56), 1♀, 35 km SE of Laura, 23.xii.1983, MBM; 2♂♂, Hells Gate Ck, S of Laura, 6.i.1981, GAD; 13♂♂ (1 male genitalic preparation no. AB6), 7♀♀, Mt Cook nr Cooktown, 31.xii.1983, MBM; 1♂, Archer Point near Cooktown, 7.i.1973, MBM; 1♂, Black Mountain, S of Cooktown, 6.i.1981, MBM; 1♀, 23 km N of Palmer River, 14.i.1982, GAD; 1♂ (genitalic preparation no. AB49), 2♀♀, McLeod River x-ing NW of Mt Carbine, 7.i.1980, A. Hiller; 2♂♂ (1 male genitalic preparation no. AB8), 1♀, McLeod River x-ing NW of Mt Carbine, 11.i.1988, MBM; 1♂, Station Creek, 15 km N of Mt. Molloy, 22.i.1981, MBM; 1♂, Station Ck, 10 km S of Mt Carbine, 28.i.1976, AMW-H; all in **MSM**. 3♂♂, 2♀♀, Silver Plains, Coen, 11,24.i.59, L. W[assell], Collection A.N. Burns; 2♂♂, 2♀♀, homestead, Silver Plains, east coast Cape York Pen., 3,7.xii.1959, at light, J.L. Wassell, Collection A.N. Burns; 1♂, Clean Skin xing, Massy Creek, Silver Plains, east coast Cape

York Pen., 8.i.60, J.L. Wassell, Collection A.N. Burns; all in **MV**. 2♂♂, 1♀, same data as holotype; all in **QM**. 2♂♂, 1♀, same data as holotype; 2♂♂, Stewart R., i-ii.1927, Hale & Tindale; 1♂, 2♀♀, Flinders I., i.1927, Hale & Tindale; all in **SAM**. 2♂♂, 1♀, same data as holotype; all in **UQIC**. 2♂♂, 1♀, same data as holotype; all in **WAM**.

Other material examined. QUEENSLAND—2♂♂ (teneral), homestead, Silver Plains, east coast Cape York Pen., 5.xii.1959, at light, J.L. Wassell, Collection A.N. Burns, in **MV**. 1♂, 7 km SE Mt Carbine, Mary R. camp, xii.1989, ANZSES Expedn, in **QM**. 1♂, Stewart R., i-ii.1927, Hale & Tindale; 1♂, Flinders I., i.1927, Hale & Tindale, both in **SAM**.

Etymology. From the Greek *ochra* (feminine) meaning earthy oxide of iron and referring to the ochraceous colour on the pronotum of this species.

Description

Male (Figs. 27, 55a, 69, 70). **Head.** Either ferruginous with black behind eyes and partly below, or black with ferruginous postclypeus and anteclypeus. Rostrum brown becoming black towards apex; reaching hind coxae but not extending beyond their apices. Ocelli light amber to light ruby red. Eyes of live specimens (Gulf region) dark brown to black. Antennae brown or blackish on those individuals with brown heads, black on those with black heads. Underside of head (excluding postclypeus) with silverish pubescence, remainder with almost no pubescence. **Thorax.** Pronotum ochraceous, sometimes with dorsal midline darkened and ferruginous or tending so, this fascia spreading laterally both at its anterior and posterior ends, especially the latter; pronotal collar ferruginous or sometimes tending blackish on those individuals with dominantly brown heads, otherwise black (except for a small middorsal area and lateral margins) on those with black heads. Mesonotum ferruginous, sometimes with the dorsal region tending ochraceous which highlights a pair of subconical ferruginous fascia basal on anterior margin of pronotum; cruciform elevation of similar colour to adjoining dorsal area; a little golden-silver pubescence on some specimens principally along margins of wing grooves. Thorax below light brown with silverish pubescence. **Wings.** Hyaline. Fore wings usually without infuscations but some individuals with a narrow infuscation at base of apical cell 2, sometimes also at base of 3, and sometimes at distal end of apical cell 1; veins mostly blackish, costa ochraceous; basal cell translucent amber; basal membrane usually orange, sometimes discoloured brownish yellow; costa and veins on basal third or so usually bearing some silverish pubescence not always obvious to naked eye. Hind wings usually with a small black infuscation at distal extremity of vein 2A; whitish plaga on vein 2A extending full length, that on 3A not quite reaching to wing margin; much of anal lobe lightly suffused golden amber, especially on basal half; venation pale brown often becoming dark towards apex. **Legs.** Light ferruginous; without markings. **Opercula.** Light brown with a weak black suffusion; lateral margin usually edged black; for the most part sparsely covered by a silverish pubescence; clearly separated exposing apex of sternite I and barely concealing tympanal cavities. **Abdomen.** Tergites ferruginous; tending dark to nearly black towards anterior margin, and on some individuals narrowly edged pale cream along posterior margin of segment 3 and extending sometimes as far as 6. Sternites ferruginous; sternite II sometimes very dark and posterior margin of segments III–VI sometimes narrowly edged pale cream.

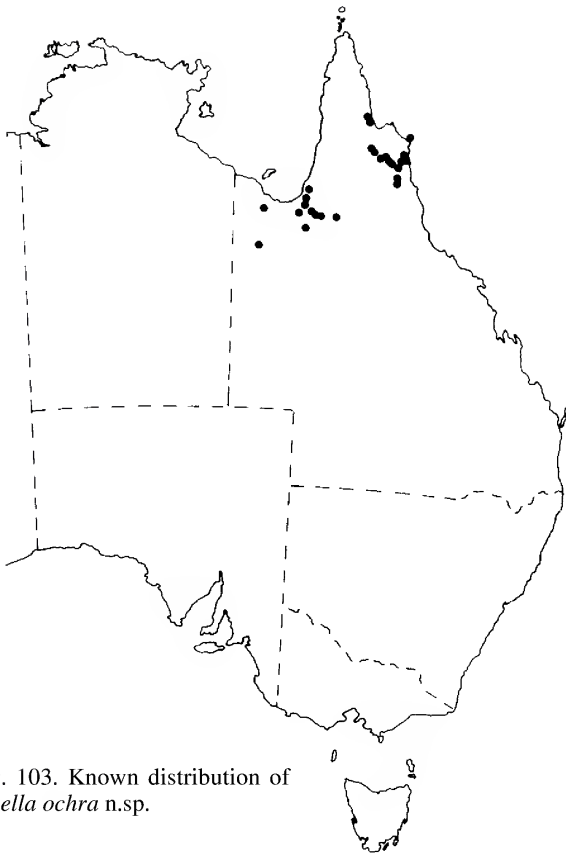


Fig. 103. Known distribution of *Tryella ochra* n.sp.

Usually bearing some fine silverish pubescence both dorsally and ventrally. *Tymbals* (Fig. 27). Usually 11 long tymbal ribs, otherwise as for generic description. *Genitalia* (Figs. 69, 70). Pygofer ferruginous; upper pygofer lobes in lateral view very broad at base, tapering gradually to a sharp upturned pointed apex, in ventral view angled inwards from near base; basal lobes without webbing fusing inner and outer lobes, outer lobe in lateral view like a very long thin finger, gently curved, almost as long as upper pygofer lobe. Uncal lobes scoop-like and gently upturned at their distal ends. Lateral processes of uncus in lateral view small and rounded. Conjunctival claws simple, sharply pointed, directed ventrally. Flabellum absent. Palearis on distal quarter of theca but not quite reaching the distal end, small and gradually tapering to zero at proximal end.

Female (Fig. 55b). Colour and markings similar to those of male. Abdominal segment 9 ferruginous, sometimes with diffused areas of black. Ovipositor sheath brown to black.

Measurements. $n = 10\text{♂}$, 10♀ (includes smallest and largest of available specimens). *Length of body*: male 15.2–18.5 (17.1); female 16.0–20.0 (18.2). *Length of fore wing*: male 21.1–25.4 (23.7); female 22.2–26.2 (24.3). *Width of head*: male 6.1–6.9 (6.4); female 6.1–7.1 (6.6). *Width of pronotum*: male 6.1–7.1 (6.6); female 6.1–7.4 (6.7).

Adult variability. Specimens from Cape York Peninsula south to the Palmer River all possess heads that are entirely black (except for the clypeus) and a predominantly black or nearly black pronotal collar; elsewhere specimens have ferruginous heads with black only behind the eyes and partly so below and a ferruginous or sometimes blackish pronotal collar.

Distinguishing features. This species is most similar to *T. castanea*, *T. burnsi* and *T. kauma*. In most cases individuals can be separated from those of the latter three species by having a light ochraceous pronotum, lack of or very reduced fore wing infuscations and a golden amber suffusion to the hind wing anal lobe. However, atypical specimens of *burnsi*, and *castanea* in particular, that closely resemble *ochra* are not uncommon and one should consult the *Key to species* or male genital structures for confirmation of identity. Care should also be taken not to confuse females of *ochra* with those of *T. lachlani*. The latter have a black cruciform elevation (unless teneral) and/or a dominantly ochraceous abdomen above; female *ochra* are never so coloured.

Distribution (Fig. 103). Northern Queensland from the lower Gulf region to northeastern Queensland between Coen and Mount Molloy. From the Gulf region there are records from as far west as the Burketown district and inland to Thornton Homestead some 120 km ENE of Camooweal. Far eastern Queensland records are primarily non-coastal although some specimens have been taken at Silver Plains and Flinders Island and near Cooktown.

It is sometimes a locally common species. There are records from early December to early February.

Habitat. Adults inhabit trees, particularly in the vicinity of water courses where they often perch high up among the smaller branches. Eucalypts are favoured.

Song. Singing occurs both during the day and at dusk; otherwise unknown.

Tryella rubra (Goding & Froggatt, 1904), n.comb.

Figs. 13, 28, 62a–e, 79, 80, 104

Tibicen ruber Goding & Froggatt, 1904: 600–601; Hahn, 1962: 11; Stevens & Carver, 1986: 265.

Abricta ruber Distant, 1905b: 281; Distant, 1906: 130; Kirkaldy, 1907b: 308; Ashton, 1914: 349.

Abricta elseyi Distant, 1905b: 281; Distant, 1906: 130; Kirkaldy, 1907a: 16; Burns, 1957: 636; Metcalf, 1963: 207; Duffels & van der Laan, 1985: 234.

Abricta rubra Burns, 1957: 637; Metcalf, 1963: 209–210; Duffels & van der Laan, 1985: 235; Moulds, 1990: 121.

Types

(a) *Tibicen ruber* Goding & Froggatt. Lectotype male, designated by Moulds (1990), King's Sound (in ANIC, "on permanent loan from MM"). Examined.

(b) *Abricta elseyi* Distant. Syntype bearing four labels: (i) small blue grey circular label handwritten in black ink "north/austral"; (ii) white rectangular label handwritten in black ink "*Abricta/elseyi*/Dist./type"; (iii) small white circular label with red border on which is machine-printed "Type"; (iv) small white circular label with blue border on which is machine-printed "SYN-/TYPE" (in BMNH). Examined.

Distant (1905b) did not designate a holotype or state the number of specimens examined. While it is probable that he had only the one specimen listed above, following Recommendation 73F of the *Code* the specimen is retained as a syntype.

Material examined. Types and the following: WESTERN AUSTRALIA—1♀, Broome, 29.xii.1985, MBM; 1♀, Broome, 3.i.1990, A. Hay; 1♀, Fitzroy River crossing, Derby-Broome road, 3.xi.1978, MBM; 2♂♂, 1♀, Fitzroy River, S of Derby, 7.ii.1989, S. Lamond; 1♂, Derby, 10.ii.1977, MBM; 6♂♂ (1 male genitalic preparation no. AB51), 2♀♀, 28 km S of Derby, 31.xii.1985, MBM; 2♂♂, 1♀, 21 km W of Penticost R. x-ing, Gibb R. Road, 30.xii.1991, MBM; 1♂, Telegraph Ck, 25 km N of Turkey Creek township, eastern Kimberleys, 3.i.1986, MBM; 9♂♂, 3 female, Kununurra, 7.i.1986, 27.xii.1991, 1.i.1992, MBM; 3♂♂, 2♀♀, Kimberley Research Stn., near Kununurra, 7.i.1986, MBM; all in **MSM**. NORTHERN TERRITORY—1♂, 2♀♀, Waterhouse River, Mataranka Hsd, 24.xii.1986, MBM; all in **AE**. 2♂♂, K179899 and K179900, 3♀♀, K179901–K179903, Waterhouse River, Mataranka Hsd, 24.xii.1986, MBM; all in **AM**. 1♂, 2♀♀, Waterhouse River, Mataranka Hsd, 24.xii.1986, MBM; all in **ANIC**. 1♂, 2♀♀, Waterhouse River, Mataranka Hsd, 24.xii.1986, MBM; all in **BMNH**. 1♂, 2♀♀, Waterhouse River, Mataranka Hsd, 24.xii.1986, MBM; all in **JO**. 1♂, 2♀♀, Waterhouse River, Mataranka Hsd, 24.xii.1986, MBM; all in **LP**. 1♂, 2♀♀, Waterhouse River, Mataranka Hsd, 24.xii.1986, MBM; all in **MNHP**. 11♂♂, 3♀♀, Keep River x-ing, Victoria Hwy, 7.i.1986, MBM; 2♂♂, West Baines R., Victoria Hwy, 8.i.1986, MBM; 1♂, 100 km WSW of Timber Creek, 6.ii.1977, MBM; 4♂♂, 6♀♀, Victoria R., 18 km W of Timber Creek township, 25.xii.1991, MBM; 1♂, Timber Creek, Victoria Hwy, 8.i.1986, MBM; 2♂♂ (one male genitalic preparation no. AB52), 1♀, 16 km W of Victoria River x-ing, Victoria Hwy, nr Fitzroy Rg, 9.i.1986, MBM; 1♂, old "Ooloo" x-ing, Daly R., 27.xi.1996, K.A. Kopestonsky; 13♂♂ (2 male genitalic preparations Nos AB91, AB92), 12♀♀, Stuart Park, Darwin, 3,7,9.ii.1991, 5,9,27.xi.1991, 10.xii.1991, 10,13,18,23,24,25,26,27.i.1992, 1,3.ii.1992, D.N. Wilson; 1♂ (genitalic preparation no. AB43), 1♀, Darwin, mid.xi.1983, R. Wood; 2♂♂, Berry Springs, 28.x.1993, 19.xi.1993, G.A. Husband; 1♀, Sth Alligator Riv., Arnhem Hwy, 11.xii.1981, A. Walford-Huggins; 1♂, 1♀ Springvale Stn, 12 km W of Katherine, 8.xii.1982, A. Walford-Huggins; 16♂♂ (one male genitalic preparation no. AB44), (one male figured "Aust. Cicadas" pl. 15, fig. 1), 4♀♀, Mainoru, ENE of Katherine, 22.xi.1981, 14.xii.1982, A. Walford-Huggins; 3♂♂, Koongarra, [nr Mt Broc kman], 29.xi.1978, at light, R.I. Storey; 69♂♂ (5 male genitalic preparations Nos AB53, AB74, AB75, AB76, AB77), 117♀♀, Waterhouse River, Mataranka Hsd, 9,10.i.1986, 23,24,25.xii.1986, 2.i.1987, MBM; 1♂, 1♀, Coolibah Ck, WNW of Top Springs 16°26'S 131°39'E, 24.xii.1991, MBM; 1♂, 27 km N of Daly Waters, 11.i.1986, MBM; 1♂, 1♀, 20 km E of Borrooloola, 23.xii.1991, MBM; 5♂♂ (one male genitalic preparation no. AB93), Borrooloola, 23.xii.1991, MBM; all in **MSM**. 1♂, 2♀♀, Waterhouse River, Mataranka Hsd, 23.xii.1986, MBM; all in **QM**. 1♀, Katherine, xii.1957, J. Wren, Collection A.N. Burns, in **MV**. 1♂, Katherine, 29.x.1975, G. Gow & P. Horner, in **NTM**. 2♀♀, Coomalie Ck, 27 km N Adelaide R., 28.ix.1977, G.F. Gross, J.A. Forrest; 1♀, Coomalie Ck, 50 km S Darwin, 28.ix.1977, G.F. Gross; 1♂, Groote Eylandt, (no date), N.B. Tindale; 1♂, 30 mi E Darwin, (no date), G.F. Hill; all in **SAM**. 3♀♀, 8 km NE by N of Mt Cahill, 12°48'S 132°44'E, 26.xi.1974, R.I. Storey; all in **UQIC**. 1♂, 2♀♀, Waterhouse River, Mataranka Hsd, 23.xii.1986, MBM; all in **WAM**.

Description

Male (Figs. 28, 62a,c, 79, 80). *Head*. Black with postclypeus ferruginous but some individuals almost entirely brown (the latter always black behind eyes and nearly always around ocelli). Often with a pale muddy-yellow blotch middorsally against posterior margin, this blotch never extending further than median ocellus. Anteclypeus ferruginous, reaching but not extending beyond their apices. Rostrum usually black dorsally and brown ventrally but sometimes almost entirely black or brown; reaching apices of hind coxae. Antennae often brown or partially so on basal segments 1 and 2, otherwise black. Head (excluding eyes and ocelli) usually covered to some extent with silver pubescence, especially so on underside. *Thorax*. Usually covered to some extent, sometimes substantially, with silver pubescence. Pronotum light to medium

ferruginous and nearly always with a distinct pale muddy-yellow middorsal fascia that is slightly expanded against pronotal collar; pronotal collar dark brown to almost black. Mesonotum ferruginous, usually a little darker than pronotum; sometimes pale dorsally highlighting a pair of dark subconical markings based on anterior margin; cruciform elevation coloured similar to majority of dorsal surface. Thorax below ferruginous. *Wings*. Hyaline. Fore wings with or without dark brown infuscations, if present then confined to base of apical cell 2, and sometimes 3, and principally on cross veins, also sometimes in basal area of apical cell 1; venation brown with costa tending pale especially to node; basal cell weakly tinted translucent amber; basal membrane pale orange-brown but sometimes suffused grey, rarely orange; costa and veins on basal third or so sometimes bearing a little silver pubescence not always obvious to the naked eye. Hind wings with a heavy black infuscation on margin at distal end of vein 2A, often also with a less intense extension along margin of anal lobe no further than vein 3A, and rarely following along veins 2A and 3A; plaga yellowish white; under magnification majority of hind wing veins pale yellow with much of ambient vein blackish. *Legs*. Medium to light ferruginous; without markings. *Opercula*. Usually unicolourous, variable between individuals from light muddy-yellow to dark ferruginous; almost meeting and extending a little beyond tympanal cavities; normally covered by fine silver pubescence not always obvious to naked eye. *Abdomen*. Tergites ferruginous and usually bearing some silver pubescence. Sternites similar in colour to tergites, sometimes sternite II muddy-yellow, occasionally some other sternites with a pale muddy-yellow posterior margin. *Tymbals* (Fig. 28). Usually 10–11 long tymbal ribs, otherwise as for generic description. *Genitalia* (Figs. 79, 80). Pygofer dark ferruginous to mid brown, usually dark dorsally; upper pygofer lobe in lateral view straight, parallel-sided for most of length with rounded apex, in ventral view angled inwards from near base; basal lobes with outer and inner lobes of similar length and entirely fused by a broad webbing, in lateral view outer lobe tapering to a point confluent with webbing. Uncal lobes scoop-like and gently upturned at their distal ends; lateral processes of uncus in lateral view small and rounded. Conjunctival claws simple, sharply pointed, directed ventrally. Flabellum absent. Paealis absent.

Female (Figs. 13, 62b,d,e). Colour and markings similar to those of male. Abdominal segment 9 ferruginous brown, occasionally with a little black suffusion. Ovipositor sheath ferruginous brown to black.

Measurements. $n = 10♂♂, 10♀♀$ (includes smallest and largest of available specimens). *Length of body*: male 16.3–22.2 (19.0); female 17.6–22.3 (20.5). *Length of fore wing*: male 23.8–28.8 (26.0); female 23.6–29.6 (27.4). *Width of head*: male 6.6–8.4 (7.3); female 6.8–8.5 (7.7). *Width of pronotum*: male 6.6–8.8 (7.5); female 7.0–9.2 (8.1).

Adult variability. Individuals of *rubra* with heads entirely brown (excluding teneral individuals) tend to be smaller than average; all seven known specimens from the Borrooloola district, NT, show this character but have typical *rubra* male genitalia. Other specimens, with entirely brown heads are known from Koongarra (just south of Jabiru) and from near Darwin, NT.

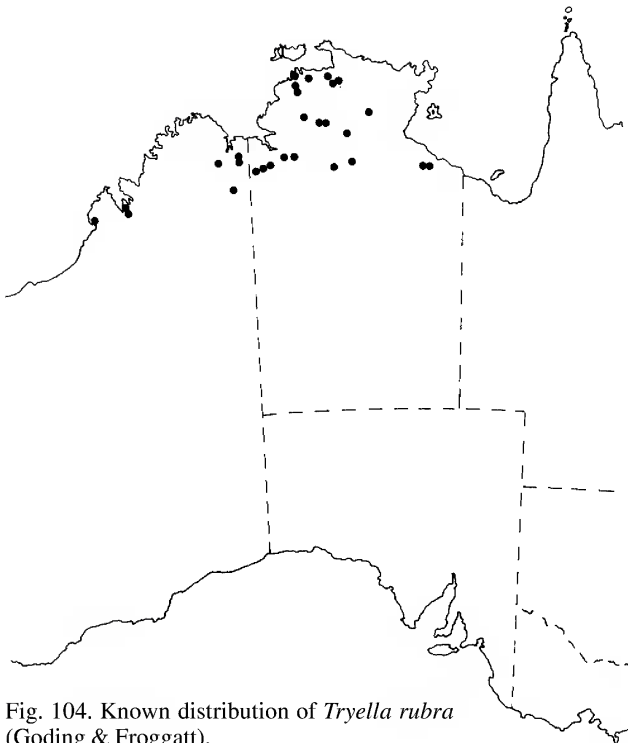


Fig. 104. Known distribution of *Tryella rubra* (Goding & Froggatt).

Distinguishing features. Typical individuals can be distinguished from other *Tryella* species by the pale mid dorsal pronotal stripe and black head. Atypical individuals can have either character absent but never both. Determination of such specimens can be obtained from the *Key to species*. The species most similar in overall appearance to *T. rubra* is *Aleeta curvicosta* which is readily distinguished on size, *rubra* never attaining a fore wing length of 31 mm and *curvicosta* always with a fore wing length exceeding 32 mm.

Distribution (Fig. 104). Northern Western Australia and the Top End of the Northern Territory from Broome to Borroloola. A lack of records from the inner Kimberley region and Arnhem Land is almost certainly an artifact of inadequate collecting.

It is sometimes a common species, but populations tend to rise and fall rapidly. Usually it is common around Kununurra, Western Australia, and I once encountered enormous numbers at Mataranka Homestead on the Waterhouse River, Northern Territory. Adults have been taken from late September to mid February but appear to be most common during late December and early January following the first summer rains.

Habitat. Adults inhabit eucalypts and other trees, usually growing in the vicinity of water courses. The upper branches are usually preferred so that adults are often beyond arm's reach.

Song. A vigorous and continuous rolling hiss-like sound sung both during the day and at dusk. Although groups of males sing together they do not sing in chorus. Males are capable of calling the morning following emergence. An analysis of the song is currently under study (Moulds, in prep.).

***Tryella stalker* (Distant, 1907), n.comb.**

Figs. 14, 29, 63a–d, 67, 68, 105

Abricta stalker Distant, 1907: 415; Ashton, 1914: 349; Burns, 1957: 637; Metcalf, 1963: 210; Duffels & van der Laan, 1985: 235; Moulds, 1990: 122, pl. 15, figs. 5, 5a.

Type. Lectotype ♀ here designated and paralectotype ♂ (in BMNH) (examined). Lectotype ♀ (abdomen missing), bearing three labels: (1) “Nicol Bay/West Australia” handwritten in india ink; (2) “Distant Coll./1911-383” machine printed; (3) “*Abricta stalker* Dist” handwritten in india ink. Paralectotype ♂, bearing three labels: (a) “Alexandria/S. Australia/G.N. *stalker*/1907-261” handwritten in india ink; (b) “*Abricta/stalker*/Dist./type” handwritten in india ink; (c) a small circular label with red border with “Type” machine printed.

Note. The syntype male and female are not conspecific. To fix the identity of this species the female is chosen as lectotype in preference to the male so as to retain the accepted concept of the species. The paralectotype male is a specimen of *T. infuscata* n.sp.

Material examined. Types and the following: WESTERN AUSTRALIA—1♂, K179962, 1♀, K179963, Fortescue R., Hamersley Range, no date, W.D. Dodd, H. Ashton Coll.; 1♂, K179904, 1♀, K179905, De Grey R. crossing, 70 km E of Port Hedland, 6.iii.1984, at light, K. & E. Carnaby; all in AM. 1♂, Nanutarra Petrol Stn, 47 mi[les] NE of Barradale, 1.vii.1972, dead in spiders web, D. & N. McFarland, in ANIC. 1♀, Fortescue R., Hamersley Range, W.D. Dodd, in BMNH. 10♂♂ (1 male genitalic preparation no. AB50), 10♀♀, De Grey R. crossing, 70 km E of Port Hedland, 6.iii.1984, at light, K. & E. Carnaby; 10♂♂, 5♀♀, W Peawah River, 90 km SW of Port Hedland, 3.iii.1984, K. & E. Carnaby; 2♂♂, 1♀, Millstream, Fortescue River S of Roebourne, 22.ii.1977, MBM; 11♂♂, 1♀, (1♂, 1♀, figured “Aust Cicadas” pl. 15, fig. 5), Marble Bar, 17,18.ii.1977, MBM; 22♂♂ (2 male genitalic preparations Nos AB26, AB47), 4♀♀, Marble Bar, 3.ii.1972, 7.i.1973, 27.ii.1973, 13,18,28.i.1974, 3.i.1975, 1.i.1977, G.R. Jones; all in MSM. 10♂♂, 2♀♀, Marble Bar, 8.ii.1973, 11.iii.1975, 27,28.xii.1975, 4.i.1976, G.R. Jones; 2♂♂, 1♀, Fortescue R., Hamersley Range, W.D. Dodd; all in SAM. 2♀♀, Dampier, 14.ii.1973, E.M. Exley; all in UQIC. 4♂♂, 4♀♀, reg. nos 34303–34310, Roy Hill, creek, i.[19]57, A. Douglas; 1♀, reg. no. 34315, Bamboo Creek, 20°56'S 120°13'E, 22.i.1974, A.M. & M.J. Douglas; 3♂♂, reg. nos 34312–34314, Nullagine, 19–20.i.1974, A.M. & M.J. Douglas; all in WAM.

Description

Male (Figs. 29, 67, 68, 63a–c). **Head.** Usually mid to dark brown but on some individuals nearly black, often with a small indistinct ochraceous blotch on midline against posterior margin; postclypeus light to dark ferruginous; anteclypeus similar in colour to postclypeus. Rostrum ochraceous to brown, tending dark or even black towards apex but usually with extreme apex pale; passing bases, but not reaching apices, of hind coxae. Antennae brown to nearly black. Often bearing some silver pubescence, especially below. **Thorax.** Pronotum often light ochraceous but on some individuals medium to dark ferruginous; occasional specimens with a ferruginous fascia on dorsal midline, this fascia spreading laterally both at its anterior end against pronotal margin as far as eyes, and at its posterior end against pronotal collar; pronotal collar medium to dark brown sometimes tending black but usually paler anterior of lateral angles. Mesonotum medium to dark ferruginous, sometimes with a slightly paler ochraceous area between cruciform elevation and anterior margin which often accentuates an adjacent pair of obconical brown markings

based on anterior margin; cruciform elevation similar in colour to that dominating dorsal region of mesonotum. Thorax above often with some silver pubescence; below nearly always with an extensive silver pubescence. *Wings*. Hyaline. Fore wings always with a zigzag infuscation following basal veins of apical cells 2–4 and usually along the length of vein R1b forming apical cell 1; venation and costa light brown or yellowish; basal cell barely tinted brown; basal membrane similar to venation in colour. Hind wings with an infuscation at distal extremity of vein 2A against wing margin and sometimes also part way along the length of 2A; plaga off white; venation light brown or yellowish. *Legs*. Light brown to yellowish, without markings. *Opercula*. Muddy pale yellow to pale brown; almost meeting and barely concealing tympanal cavities; usually covered by fine silver pubescence not always obvious to naked eye. *Abdomen*. Tergites mid to dark brown, of even or nearly even tone but usually with tergite 2 paler laterally and tergite 8 darkened on posterior half with posterior margin narrowly edged black. Sternites mid to dark brown but often a broad band along midline darkest. Abdomen above and below often with silver pubescence not always obvious to naked eye. *Tymbals* (Fig. 29). Usually 10 long tymbal ribs, otherwise as for generic description. *Genitalia* (Figs. 67, 68). Pygofer ferruginous; upper pygofer lobes in lateral view very broad at base, gradually tapering to a blunt point or rounded apex, nearly straight, in ventral view angled inwards with division of terminal section not distinct; basal lobes without webbing fusing inner and outer lobes, outer lobe in lateral view like a very long thin finger, gently curved, not quite as long as upper pygofer lobe. Uncal lobes scoop-like and gently upturned at their distal ends; lateral processes of uncus in lateral view broad at base tapering to a thin rounded extremity. Conjunctional claws simple, sharply pointed, directed ventrally. Flabellum absent. Palearis on distal quarter of theca, the proximal end heavily chitinized as a small but prominent rounded lobe.

Female (Figs. 14, 63d). Colour and markings similar to male. Abdominal segment 9 similar in colour to abdomen, sometimes with dorsal beak darkened or nearly black. Ovipositor sheath usually darker than abdominal segment 9 and sometimes black or nearly so; clearly extending beyond dorsal beak.

Measurements. $n = 10 \text{♂♂}$, 10♀♀ (includes smallest and largest of available specimens). *Length of body*: male 18.1–21.1 (19.1); female 19.5–23.1 (20.8). *Length of fore wing*: male 20.4–25.0 (23.1); female 23.6–27.2 (25.3). *Width of head*: male 5.9–7.0 (6.4); female 6.1–7.5 (6.8). *Width of pronotum*: male 6.5–7.6 (7.1); female 6.9–8.3 (7.6).

Adult variability. The distinctive light ochraceous pronotum that contrasts with the darker head and mesonotum is found on specimens from all known localities. A darker form, which has the pronotum concolorous with the mesonotum, is known only from a series of specimens taken over a number of years at Marble Bar.

Distinguishing features. This species is most similar to *T. noctua* and *T. occidens*. Individuals with a pale pronotum are immediately distinguished by that feature. Individuals of uniform body colour differ from *noctua* and *occidens* by lacking black pigmentation on the hind wing adjacent to

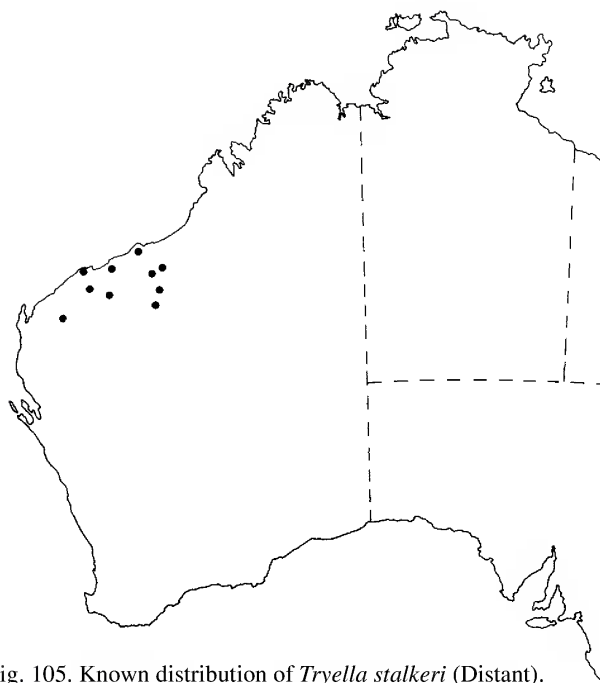


Fig. 105. Known distribution of *Tryella stalkerii* (Distant).

vein 3A. There is also some similarity to *T. crassa* but the fore wing infuscation of *stalkerii* reaches, or very nearly reaches, the top of 3rd ulnar cell whereas that of *crassa* does not approach anywhere near top of 3rd ulnar cell.

Distribution (Fig. 105). North-western Western Australia between the De Grey and Ashburton Rivers. There are records from Dampier (= Nickol Bay, type locality), Fortescue River at Millstream and near the Hamersley Rg, the Peawah River, Marble Bar and Nullagine. The species is locally common in some seasons. Adults have been taken from late December to mid March.

Distant (1907) records this species from Alexandria, Northern Territory, but this record almost certainly pertains to *T. infuscata* n.sp., q.v. Distant's mention of South Australia in regard to Alexandria stems from the fact that the Northern Territory was at the time under the administration of South Australia.

Habitat. Adults usually inhabit eucalypt trees, especially in the vicinity of watercourses, where the upper branches are often preferred.

Tryella willsi (Distant, 1882), n.comb.

Figs. 59a,b, 94, 95, 106

Tibicen willsi Distant, 1882: 127, pl. VII; Goding & Froggatt, 1904: 609.

Abrieta willsi Distant, 1905a: 27; *ibid.*, 1906: 131; Froggatt, 1907: 351; Kirkaldy, 1907b: 308; Ashton, 1914: 349; Kato, 1932: 181; Burns, 1957: 637; Metcalf, 1963: 210; Wagner, 1968: 155; Duffels & van der Laan, 1985: 235; Moulds, 1990: 123–124; Ewart, 1993: 139.

Types

(a) Lectotype female here designated and 2 paralectotype females (in BMNH) (examined). Lectotype ♀ bearing five labels: (i) "Peak Downs." handwritten in india ink; (ii)

“*willsi*/Dist.” handwritten in india ink; (iii) “SYN-/TYPE” machine printed on circular label with blue border; (iv) circular label with red border on which is machine printed “Type”; (v) “Distant Coll./1911-383” machine printed. Two paralectotype ♀♀ each bearing three labels: (i) “Peak Downs” machine printed; (ii) “Distant Coll./ 1911-383.” machine printed; (iii) “SYN-/TYPE” machine printed on circular label with blue border; and one specimen bearing an additional label stating “*Abricta/willsi* Dist./det. R.J. Izzard. 1961./♀ comp. with type”.

There are also 2♂♂ in BMNH labelled “Peak Downs”, “Distant Coll./1911-383” that have been previously considered syntypes of *willsi*. Distant (1882) clearly had only females (except for a male in ZMH discussed below) so these specimens cannot be syntypes of *willsi* and are here disregarded.

(b) Paralectotype male and paralectotype female (in ZMH) (examined). Paralectotype ♂ bearing four labels: (i) “Sidney[sic]/Mus. Godeffroy./No. 17625” machine printed with 17625 handwritten in india ink; (ii) label with bold black printed border, a fine inner printed border within which “No.” is machine printed at the top left hand corner and “Museum Godeffroy/Hamburg” between the borders at top and bottom respectively, and handwritten inscription in india ink “17625./Tibicen./willsi./ Sidney/Dist” (possibly the oldest label); (iii) label with printed black border within which is handwritten “W. willsi Dist.”; (iv) pink label on which is machine printed “Paratype”. Paralectotype ♀ bearing three labels: (i) “Peak Downs” handwritten, “Mus Godeffroy./No.” machine printed, “17625” handwritten; (ii) label with bold black printed border, a fine inner printed border within which “No.” is machine printed at the top left hand corner and “Museum Godeffroy/Hamburg” between the borders at the top and bottom respectively, and handwritten inscription in india ink “17625./Tibicen./willsi./PK Downs/Dist.” (possibly the oldest label); (iii) pink label on which is machine printed “Paratype.”

Lectotype and paralectotype designations. Distant (1882) based his description of this species on nine females but added a footnote stating that “[Since writing the above I have discovered one male specimen of this species in the Godeffroy collection, which was received from Sydney...]”. Under Article 72.4.1 of the *Code* this male could be considered to form part of the type series and that Wagner (1968) correctly listed this male (plus a female) in ZMH as syntypes. All six syntypes are conspecific. I am reluctant to designate the single male as a lectotype because it could be argued by some that it does not form part of the type series. The female selected as lectotype has been so chosen because it is typically coloured and is here designated so as to clarify the identity of this species.

Type locality. Distant (1882) lists Peak Downs and Sydney as type localities. Only the male in ZMH is labelled as coming from Sydney. Distant’s footnote to the original description states that this male “was received from Sydney” and it appears likely that Distant assumed it originated from Sydney. As it is conspecific with the 5 known females, and the known distribution of the species is restricted to Queensland, it is reasonable to consider this male incorrectly labelled and that Sydney is an erroneous locality.

Material examined. Types and the following specimens: QUEENSLAND—8♂♂, K179906–K179913, 8♀♀, K179987–K179994 “Separation” nr Duarina, xii.1993–iv.1994, A.W. Smith; 2♀♀, K179958, K179959, Carnarvon Rge, 14.xii.1948, N. Geary; all in **AM**. 1♂, 10 km W of Undilla Hsd, 95 km ENE of Camooweal, 21.xii.1986, **MBM**; 2♀♀, nr Undilla Hsd, 60 km ENE of Camooweal, 21.xii.1986, **MBM**; 1♂, Selwyn Mine, 160 km SE of Mt Isa, 30.i.1991, T. Woodger; 3♂♂, 2♀♀, Nonda railway stn, 70 km W of Richmond, 6.i.1987, **MBM**; 5♂♂, 1♀, 30 km N of Hughenden, 21.i.1977, **MBM**; 10♂♂ (1 male genitalic preparation no. AB54), 34♀♀, 60 km E of Hughenden, 4.ii.1981, **MBM**; 1♂, Sheepskin Ck, [nr Connors R.], 75 mi SSW of Sarina, 10.xi.1973, **AMW-H**; 1♂, Barcaldine, 10.ii.1981, **MBM**; 6♂♂, 2♀♀, “Noonbah”, SW of Longreach, 27,28,31.i.1998, 1,2,4,5,6.ii.1998, A. Emmott; 2♂♂, 40 km SE of Blackall on Barcoo R., 30.xii.1993, J.E. & M.S. Heath; 20♂♂, 96♀♀, Barcoo R, S of Blackall, 24°35'01"S 145°48'31"E, 29.xii.2000, **MBM**; 1♀, Bee Ck, 25 km SW of Nebo, 6.ii.1981, **MBM**; 2♂♂, 3♀♀, 60 km NE of Clermont, 7.ii.1981, **MBM**; 1♂, 6♀♀, 100 km NW of Marlborough, 28.i.1981, P.S. Valentine; 2♀♀, Grave Gully, approx. 40 km N of Marlborough, 3.ii.1973, **AMW-H**; 1♀, 2 km W of Emerald, 1.i.1994, J.E. & M.S. Heath; 7♂♂, 13♀♀, “Mourangee”, near Edungalba, on red soil tableland, 14.xi.1987, E.E. Adams; 1♂, 3♀♀, Mourangee Hsd, near Edungalba, 18.xii.1985, R. Adams; 1♂, 3.5 km N of Mourangee Hsd, near Edungalba, 7.xi.1986, E.E. Adams; 5♂♂, 2♀♀, same data but 4 km N and 20,23.i.1991; 1♀, same data but 3 km E and 28.i.1991; 1♀, same data but 5 km E and 5.xii.1983; 3♂♂, 9♀♀, same data but 4 km SE and 28.i.1991; 9♂♂, 7♀♀, same data but 5 km S and 14.xii.1983, 11,28.xi.1987; 2♂♂ (1 male genitalic preparation no. AB55), 1♀, same data but 5 km SW and 24.xii.1983; 2♀♀, same data but 2 km WNW and 6.xi.1986; 1♀, “Bellwood”, near Edungalba, 25.xii.1983, E.E. Adams; 21♂♂, 10♀♀, foothills of Blackdown Tableland, Expedition Range, 23.xii.1972, **MBM**; 1♀, Springsure, 28.xii.1995, D. Kitchin and T. Jack; 2♀♀, 6 km NE of Rolleston, 24.xi.1986, **MBM**; 1♂, 65 km S of Rolleston, 20.xii.1983, **MBM**; 3♀♀, Charleville, 19.xii.1995, Colin Dollery; 1♀, Biloela, 21.xii.1995, D. Kitchin, T. Jack; 1♂, Theodore, 16.i.1991, **GAD**; 7♂♂ (1 male genitalic preparation no. AB81), 4♀♀, Mt Scoria, near Thangool, 21.xi.1987, R. Eastwood; 5♂♂, 2♀♀, 49 km SSE of St George near Moonie R., 18.xii.1983, **MBM**; all in **MSM**. 1♀, 60 km E of Hughenden, 4.ii.1981, **MBM**; 1♀, Hughenden, (no date), H.H. Batchelor; all in **QM**. 1♀, Cloncurry, 7.ii.1966, P. Brown; 1♀, Biloela, 12.i.[19]47, A.R. Bird; 1♂, Linville, 16.xii.[19]51, G. Saunders; 2♂♂, 2♀♀, 28 km ENE of Eulo, 28°04'S 145°18'E, 16.iii.1991, C.J. Burwell; all in **UQIC**.

Description

Male (Figs. 59a, 94, 95). *Head*. Black; postclypeus dark reddish brown; anteclypeus black, sometimes with a hint of brown. Rostrum brown at base becoming black apically; passing bases but not apices of hind coxae. Ocelli amber to ruby red. Antennae black. Head above lacking obvious pubescence, below usually with silver pubescence primarily on lorum and not always obvious to naked eye. *Thorax*. Pronotum orange yellow with a broad black fascia on midline, this fascia spreading laterally both at its anterior end against pronotal margin and at its posterior end against pronotal collar; pronotal collar black but sometimes brown anterior or lateral angles; anterior and posterior oblique fissures strongly mottled black or dark brown. Mesonotum usually black but sometimes dark ferruginous but always with a large black blotch immediately anterior of cruciform elevation and along lateral margin above wing bases; cruciform elevation either black or mid brown. Thorax above without noticeable silver pubescence. Thorax below partly black and partly brown but always brown adjacent to legs and usually bearing fine silver pubescent not obvious to naked eye. *Wings*. Hyaline. Fore wings with distinct infuscations at bases of apical cells 2 and 3 and sometimes also extending to cell 1, the infuscations at bases of cells 2 and 3 usually a continuous zigzag but occasionally

divided into two; venation brown to black, costa ochraceous usually with costal vein brown; basal cell always partly or entirely tinted translucent brown; basal membrane orange; costa and veins on basal third or so occasionally bearing some silver pubescence not visible to naked eye. Hind wings usually with a distinct infuscation at distal end of vein 2A; plaga light brown often with a dark tinge either side of plaga on 3A and a very weak brownish tinge barely discernible principally over basal half; venation brown. *Legs*. Brown, sometimes partly tending black, without markings. *Opercula*. Light yellowish brown contaminated to varying degrees by black suffusion; usually carrying some silver pubescence usually not discernible to naked eye; clearly separated exposing apex of sternite I and barely concealing tympanal cavities. *Abdomen*. Tergites black or nearly so, the posterior margin of segments 2–7 ochraceous or ferruginous, tergite 8 black to varying degrees but always substantially black dorsally and usually substantially ferruginous laterally. Sternites ferruginous; posterior margin of III–VI ochraceous; midline of sternites with a distinct, but not sharply defined, black fascia. Abdomen above and below often with some silver pubescence but usually not obvious to naked eye. *Tymbals*. Usually 10–11 long tymbal ribs, otherwise as for generic description. *Genitalia* (Figs. 94, 95). Pygofer black or brown and black; upper pygofer lobes in lateral view with upper margin distinctly curved outwards in central region, lower margin straight with distal end curved upwards towards an upturned pointed apex, in ventral view angled slightly inwards near midpoint and outwards on distal quarter; basal lobes with a broad webbing fusing much of outer and inner lobes, in lateral view outer lobe just a short finger-like projection beyond webbing. Uncal lobes scoop-like and gently upturned at their distal ends; lateral processes of uncus in lateral view nearly equal in length to upper pygofer lobes, straight, parallel-sided, apex nearly square. Conjunctival claws simple, sharply pointed, directed laterally. Flabellum a large rounded lobe across entire ventral surface. Palaris near distal end of theca, rounded with proximal end gradually tapering.

Female (Fig. 59b). Colour and markings similar to male. Abdominal segment 9 dark ferruginous brown tending black; always black dorsally including dorsal beak. Ovipositor sheath black and clearly extending beyond dorsal beak.

Measurements. $n = 10\delta\delta$, $10\eta\eta$ (includes smallest and largest of available specimens). *Length of body*: male 15.3–19.2 (17.9); female 16.5–21.8 (19.9). *Length of fore wing*: male 20.4–24.3 (23.0); female 21.9–26.5 (24.9). *Width of head*: male 5.4–6.2 (5.9); female 5.5–6.8 (6.3). *Width of pronotum*: male 5.5–6.6 (6.2); female 5.7–7.1 (6.7).

Distinguishing features. This is clearly the blackest of all *Tryella* species and typical specimens are unlikely to be misidentified. However, a series of three males and two females from Nonda in the central west of northern Queensland, show a basic ferruginous pigmentation rather than black and slightly reduced fore wing infuscations so that they are indistinguishable from *T. burnsi* without reference to male genitalia. Even then care must be taken in assessing characters; the presence of a well-developed paleris on the aedeagal theca of *willsi* clearly distinguishes this species from *burnsi*. The known distributions of these two species are, for the most part, allopatric but they may

be possibly sympatric in coastal districts between Mackay and Rockhampton although all known records for the two species in this region are separated by the Connors Range, *willsi* occurring only to the west and *burnsi* only to the east.

Aberrant specimens might also be confused with *T. graminea* but are at once distinguished by the glass-clear wings of *willsi* compared to the slightly tinted wings of *graminea* (clearly visible when held above a white background).

Distribution (Fig. 106). Inland Queensland from Undilla Stn near Camooweal in the north-west of the State to near Eulo (Burwell, 1991) and St George in the south and possibly to Bourke in northwestern NSW (Goding & Froggatt, 1904). To the east it extends to near Hughenden, the Isaac River, Mt Scoria near Thangool and possibly to Linville although the latter requires confirmation. Western limits in central Queensland include Blackall and the Rolleston/Injune road near Carnarvon Gorge. Adults are sometimes locally common. There are records from early November to mid February.

The distribution for this species given by Moulds (1990) includes records of *T. burnsi* n.sp. unrecognized at the time as a separate species. Records of *T. willsi* from Sydney (Distant, 1882) and King's Sound (Goding & Froggatt, 1904) are considered erroneous.

Habitat. Shrubs and small trees, especially eucalypts and often *Acacia* species, including brigalow (*A. harpophylla*).

Song. A continuous hissing call sung both during the day and at dusk; otherwise unknown.

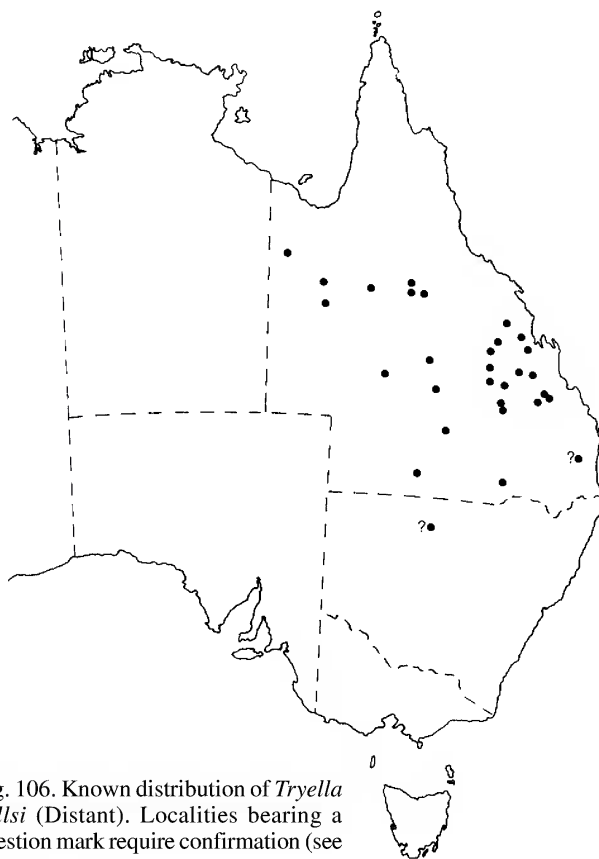


Fig. 106. Known distribution of *Tryella willsi* (Distant). Localities bearing a question mark require confirmation (see text).

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